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CHAIR'S CORNER

Steven Manolis
Chair

Quality specifications matter

What makes a good specification? A good specification ensures quality. When the specification requirements are satisfied, the result is a quality product – every time. Likewise, a good specification may be tough, but it must be practical to meet. When quality materials are used, accompanied by proper execution during production and construction, the resulting product should meet the specification – every time.

One of the emerging challenges for OAPC members are changes to municipal specifications which are proving impractical to meet on a consistent basis. Municipal owners wish to ensure quality – as they should. They are making changes to specifications in an effort to improve quality. Our members are, however, unable to consistently meet some of the amended specifications even when quality materials, production, and construction methods are used.

We must increase the trust that our municipal stakeholders place in OAPC. We must demonstrate to our municipalities that OAPC is sincere in our approach to quality and can provide valuable consultation such that new specifications both ensure quality and are practical to meet. We have work to do in order to earn this trust.

During one meeting with a municipality, we took the time to listen and try to understand the challenges that the municipal stakeholder was trying to solve. Their concerns made sense. We also took the time to explain our shared commitment in implementing specifications that ensured quality and were practical to meet. The municipality responded that they felt we were a lot closer in sharing common goals than they thought we would be going into the meeting. Our efforts will continue and I believe that they will gain traction because we are sincere in our approach and our commitment to quality.

OAPC is currently developing the framework for a plant certification program with the goal of providing customers and government agencies a means of verifying

that certified producers can produce and supply quality product in an environmentally compliant manner. We expect to be able to provide more information on this initiative to our members in the second quarter of 2025.

Work continues on our project to develop an Environmental Product Declaration (EPD) for asphalt mixtures in Ontario. OAPC has received funding from the National Research Council Canada (NRC) and has engaged WAP Sustainability as our Life Cycle Assessment (LCA) consultant. This project will proceed in phases, and the efforts to create LCA and Life Cycle Inventory (LCI) data sets which are required to develop the EPD are expected to continue into Q3 2025.

The next major event on OAPC's calendar is the Fall Asphalt Seminar which will be held on November 28, 2024. The sessions are relevant and engaging and we invite our OAPC members and our government, academic, and other stakeholders to join us. Topics will include decarbonization of asphalt and the use of warm mix to reduce Greenhouse Gas (GHG) emissions, asphalt specifications and impacts on quality, a recap of the 2024 Asphalt Technical Symposium held in June, and asphalt mix performance testing among others. We will present some very special OAPC awards during the seminar. Speakers include representatives from the National Asphalt Pavement Association (NAPA) in the U.S., MTO, Women of Asphalt, and the Canadian Technical Asphalt Association.

The Chair's Dinner will be held on November 27, 2024, which is the evening prior to the Fall Asphalt Seminar. This special event will feature a live auction for asphalt research and the presentation of OAPC awards. We invite all who are interested to register and join us! ■



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OPERATIONS CORNER

Doubra C. Ambaiowei
Director, Technical Services

Continuing strides of momentum!

I believe that taking small steps towards achieving our goals ultimately leads to giant strides of momentum. At the start of my journey, as ORBA/OAPC Technical Director, I set specific goals in accordance with my core charge to promote the quality use of HMA and to provide general support for all other road building materials, including construction best practices. These revolved around the action plans to:

- Broaden knowledge and understanding of specific Ontario asphalt industry challenges;
- Diversify capabilities; and
- Improve member efficiencies and experiences.

Looking back to my early days, preparations were just being made to release the *Quality of Asphalt Report – A Review of Ontario Asphalt Industry Practice*. In 2018, we explored the *Top 10 List: Ways to Get More Durable HMA Pavements* at the Fall Asphalt Seminar. In 2019, we pushed the needle towards *Finding a Better Approach: Getting Paving Right in Ontario*. In 2020, the conversation shifted towards exploring *Innovation and Collaboration as a Tool for Paving the Way for Excellence*.

This focus set the stage for us to *Advance through Collaborations & Partnerships – Continuing to Pave the Way for Excellence* in 2021, with a follow-up on the specifics of *Innovations in Asphalt Technology: Materials & Paving Equipment* in 2022. In 2023, we *Advanced with the Times – Focusing on the People and Processes in Asphalt Technology*. Now, we are set to seek ***Pathways to a Sustainable Future for Asphalt Technology***.

The 2024 Fall Asphalt Seminar (FAS) theme is built on the momentum gained from previous years, echoing our dedication to quality and sustainable asphalt pavements. The keynote presentation from our ally, the National Asphalt Pavement Association (NAPA), is expected to explore challenges the asphalt paving industry must combat

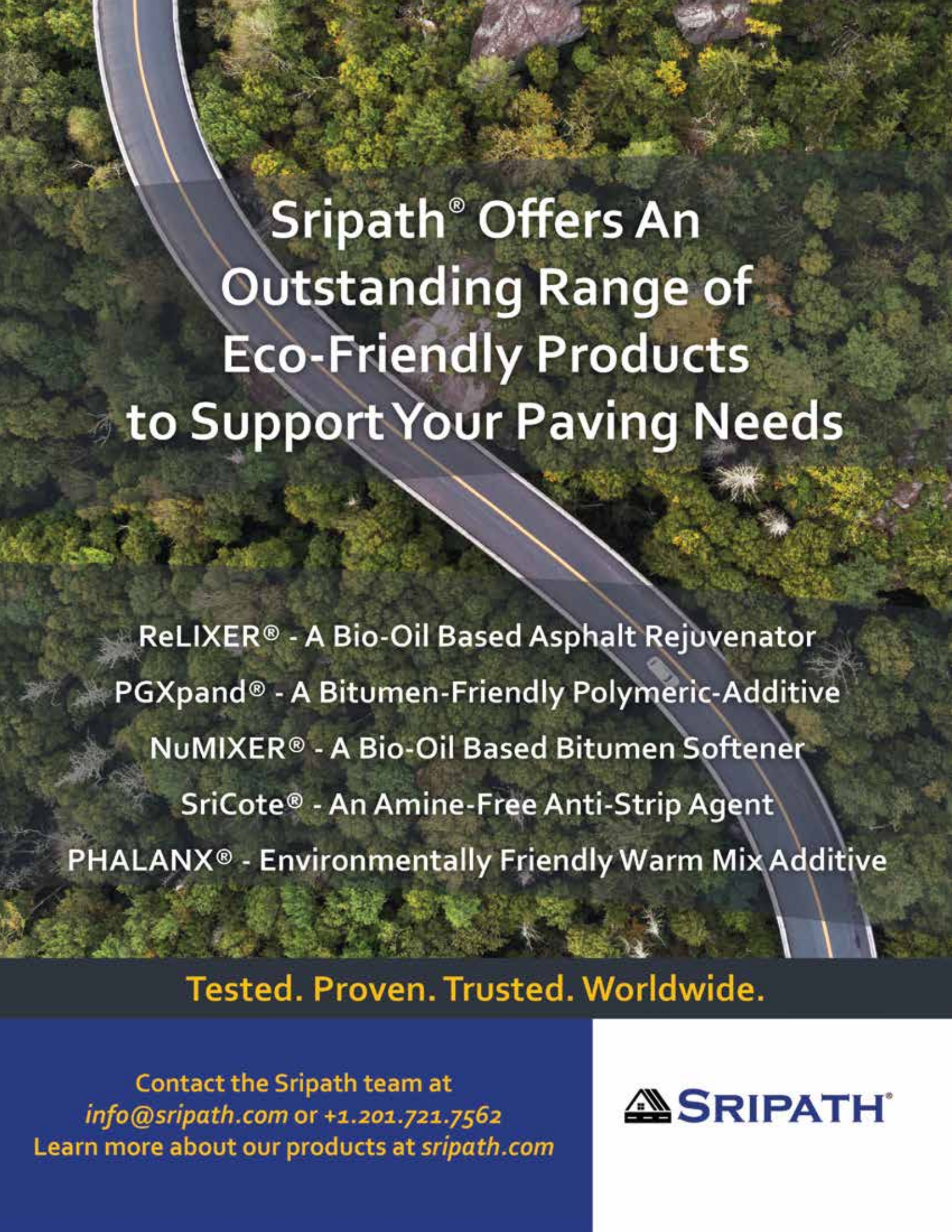
in its quest to decarbonize sustainably by optimizing current operations and leveraging more efficient technologies and processes aimed at realizing **quality, performance, cost savings and enhanced profitability**. It will expand on each of the levers for asphalt carbon footprint reduction in more detail: controlling moisture, improving plant efficiency, increasing recycled material content, and reducing production temperature. Additional highlights will include an overview of the combined efforts of government and industry in navigating the path towards a sustainable future for asphalt paving in Ontario and Canada.

We are continuing to effectively utilize the Ontario Asphalt Expert Task Group (OAETG) as a special purpose vehicle of the Asphalt Technical Symposium (ATS) platform to broaden industry's knowledge and understanding of asphalt-related challenges.

We continue to improve member efficiencies and experiences through collaboration with the province, municipalities, and other industry and external partnerships, and the gains are self-evident. **We are solving one problem at a time while mapping sustainable pathways for our industry's future**. The FAS on November 28 will highlight these wins ranging from research outcomes to specifications in implementation, and the opportunity to hear feedback from delegates on the current state of the industry.

Without letting too much out of the bag, I hope you will take the time to read this fall issue of *ASPHALTopics* magazine which traditionally highlights the key messages expected at the FAS. I also expect to see you at the FAS. The speakers and presenters will provide more details around the giant strides of our momentum!

Please enjoy the contents of this edition of *ASPHALTopics* and endeavour to make the most of the yuletide. I look forward to hearing from you pertaining to all things asphalt. **HAPPY HOLIDAYS! ■**



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MARCOM MATTERS

Doubra C. Ambaiwei
Director, Technical Services

2025 Road Building Academy focuses on quality and sustainable asphalt pavement



The Ontario Road Builders' Association's (ORBA) annual Road Building Academy is scheduled to take place from March 3 to 7, 2025, at the Kingbridge Centre in King City, Ontario. In line with OAPC's educational priorities, both repeat and new asphalt-focused courses will be offered to improve member efficiencies, experiences, and capabilities to deliver sustainable and high-quality asphalt pavement.

As it relates to designing, producing, placing, and managing asphalt roadways, our 2025 course offerings will see a return of the Asphalt Institute's **Paving Inspector Course (PIC)** which covers information essential for inspection and project management personnel to ensure asphalt pavements reach their intended service life. The PIC program will satisfy many of the personnel qualification requirements identified in ASTM D3666, Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials. As agencies have differing policies and requirements, each registrant should determine whether or not their local agency accepts this pavement inspection certification.

Another returning course, **Fundamentals of Asphalt Plant Operations**, introduces the basics, techniques and innovations in asphalt plant and paving operations. It emphasizes the fundamentals of hot mix asphalt (HMA) materials, recycling, and plant management, and provides an overview of the OAPC Trillium Award Program, including the next steps towards asphalt plant certification, to better assist plant owners and operators meet and exceed high-quality standards and environmental stewardship.

Our focus on resolving typical challenges encountered in the production, transport, placement and compaction of HMA is addressed with the repeat of **Practical Solutions in Hot Mix Technology 2.0**. The fundamental theory in hot mix technology is discussed in combination with practical experiences through participant discussions to

provide a stronger understanding of current realities and new perspectives. Participants will learn about new equipment, materials and processes, Marshall and Superpave methods of mix design, balanced mix design, production protocols and techniques, construction and testing requirements.

NEW! Being introduced for the first time is **Mastering Pavement Preservation: Techniques and Best Practices**. This course provides an in-depth understanding of pavement preservation for professionals at all levels of the industry, including contractors, consultants, material suppliers, and agency owners. The course covers the essential need for pavement preservation and explores a variety of techniques such as crack sealing, micro surfacing, slurry seals, and chip seals. Participants will gain practical insights into design and field applications, learn about material specifications and relevant quality control test methods, and understand best practices for construction and field quality inspection. Additionally, the course will address methods for reviewing field performance to ensure compliance with warranty requirements. Co-instructed by industry experts, this course is designed to equip attendees with the knowledge and skills needed to effectively manage pavement preservation projects.

The 2025 Road Building Academy is an opportunity to learn new skills or brush up on existing ones. We trust you will join us to enhance your expertise and contribute to the longevity and performance of pavement infrastructure in Ontario. To register or learn more about the Academy, including how to take advantage of the **Canada-Ontario Job Grants Program** which gives direct financial support for employee training, please visit <https://orba.org/education/academy>. ■



As climate change increasingly impacts our economies and daily life, the global drive for net-zero carbon emissions by 2050 is gaining urgency. This transition will significantly affect all sectors, particularly pavement construction and infrastructure maintenance. Decarbonizing the asphalt industry is not only a social responsibility but also in the industry's long-term best interest.



by Jean-Paul Fort

DECARBONIZING THE ASPHALT INDUSTRY: PAVING THE WAY TO A SUSTAINABLE FUTURE

In the U.S., alongside the Infrastructure Investment and Jobs Act (IIJA) of 2021, the Inflation Reduction Act (IRA) of 2022 allocates \$4.5 billion to reduce greenhouse gas (GHG) emissions in the construction materials sector. This funding is distributed through the General Services Administration (GSA) (\$2.15B), FHWA/DOT (\$2B), and EPA (\$350 million).

In response to IIJA and IRA initiatives, and to improve sustainability and boost profitability, in 2022 the National Asphalt Pavement Association (NAPA) launched the *Road Forward* initiative to guide the asphalt industry toward net-zero production by reducing GHG emissions and removing or offsetting any remainder. The initiative's four goals address Scope 1, 2, and 3 emissions across direct operations, purchased energy, and the supply chain:

1. Reduce carbon emissions from asphalt production and construction (Scope 1 emissions);
2. Partner with customers to enhance pavement longevity and efficiency (downstream Scope 3 emissions);
3. Develop a net zero materials supply chain (upstream Scope 3 emissions); and
4. Transition to renewable electricity and improve energy efficiency (Scope 2 emissions). »

QUANTIFICATION TOOLS

To effectively reduce GHG emissions in the asphalt industry, tools based on Life Cycle Assessment (LCA) studies and Product Category Rules (PCRs) are essential. Adhering to recognized standards like ISO or EN ensures reliability, transparency, and comparability, enabling accurate measurement and benchmarking, and promoting low-carbon materials.

LCAs evaluate environmental impacts across a product's life cycle, whether from "cradle-to-gate" or "cradle-to-grave" in accordance with ISO 14040/14044 standards. The FHWA Pavement LCA Framework provides specific guidance for asphalt pavements.

Environmental Product Declarations (EPDs) are public documents that communicate environmental impacts, including GHG emissions, based on LCA results. They follow PCRs to ensure consistency and comparability of products serving similar functions, e.g. asphalt mixes that meet the same specifications. NAPA revised and updated their 2017 PCR for U.S.-produced asphalt mixtures in 2022 and extended them to Canadian provinces with validity through 2027. EPDs comply with ISO 14025 and ISO 21930 standards, ensuring transparency and third-party verification.

EPDs produced through NAPA's Emerald Eco-Label program report on key environmental impact indicators such as global GWP-100 (Global Warming Potential over 100 years), energy use, water use, and emissions to air, water, and soil. The program's life LCA data evaluates the environmental impacts of asphalt mixtures up to the point they leave the production facility. These impacts include materials (A1), transportation (A2), and production (A3).

NAPA's Emerald Eco-Label program helps members input plant data, perform LCA calculations, and publish certified, plant and mix specific EPDs using "Cradle-to-Gate" data from these modules.



Key stages of the asphalt pavement life cycle with reference to the ISO 21930 life cycle information modules

**Optimize plant operations.
Maximize RAP use. Optimize
production temperatures.**

STRATEGY FOR REDUCING EMISSIONS OF ASPHALT MIX PRODUCTION AND SAVING MONEY (A1-A3)

To reduce our carbon footprint while maintaining pavement performance and staying competitive in a low-bid system, we must focus on the interconnected actions that balance carbon reduction, performance, and cost. We should prioritize the "low-hanging fruits" that are profitable on their own and provide immediate payback through operational cost savings.

1st Priority: Optimizing plant operations

- **Stockpile moisture control** provides immediate returns that cover capital expenses like paving yards or covering piles. Reducing moisture saves energy, lowers CO₂ emissions (1 per cent less moisture equates about a 13°C (25°F) temperature drop in term of energy savings and carbon reduction), and improves quality by allowing more heat for drying aggregates and activating RAP binder. On average, **a 1 per cent increase in moisture raises drying**

energy by 11 per cent and reduces production rates by 11 per cent, though this varies with plant and material conditions.

- **Plant efficiency improvements** are self-financing through operational savings and can reduce A3 emissions by up to 15 per cent.

2nd Priority: Maximizing RAP use

Increasing RAP use by 1 per cent reduces GWP by over 0.3 kg CO₂e and lowers costs by \$0.3 per tonne of asphalt. These savings result from decreased demand for virgin aggregates and binder, avoiding the emissions and costs associated with their extraction and processing, and after also accounting for milling, hauling, and processing RAP.

3rd Priority: Optimizing production temperatures

Use the lowest feasible production temperature that still ensures proper drying of aggregates, activation of the RAP binder, and achieving the target in-place density. Reducing moisture in aggregates and RAP helps.

OPTIMIZING PLANT OPERATIONS TO REDUCE EMISSIONS (A3)

About 50 per cent of the energy required to produce asphalt mixtures is used to dry aggregates and RAP, making moisture control in stockpiles one of the most effective ways to improve plant operations, reduce emissions, and save money.

Strategies to reduce drying costs and GWP include paving, sloping yards, or covering stockpiles. The cost-effectiveness of covers depends on material properties, gradation, climate, and storage duration

Reducing moisture content also minimizes steam expansion. Water expands 1,700 times in volume in the transition to steam. Excess moisture in the dryer and exhaust stack slows production, raises costs, increases the carbon footprint, and impairs mixture durability, causing issues like stripping and tenderness during compaction. RAP poses additional challenges by retaining more moisture than virgin aggregates, hindering binder activation through preferential heat absorption during vaporization.

Beyond managing stockpile moisture, several other plant operation factors affect both GWP and costs (see QIP-132). Monitoring and adjusting the following parameters can help reduce both:

1. **Insulation:** Heat loss can increase energy loss by up to 10 per cent. Proper insulation and maintaining drum flights help mitigate these losses.
2. **Air leaks:** Air leaks use more fuel to heat excess air. Managing excess air ensures complete fuel burning, saving 5 to 10 per cent in energy consumption.
3. **Stack temperature:** Lowering exhaust gas temperatures by adjusting flighting and using variable frequency drives (VFDs) can reduce fuel consumption by 3 to 4 per cent. However, the temperature must remain above the dew point to avoid condensation in the baghouse.
4. **Burner tune-ups and fuel selection:** Fuel type and regular burner tune-ups can significantly improve efficiency, potentially reducing energy costs by up to 3 per cent and lowering carbon emissions. Natural gas is the preferred fuel for asphalt plants due to its lower cost, lower carbon

intensity, and decreased maintenance requirements compared to liquid fuels.

INCREASING RAP TO REDUCE EMISSIONS (A1)

Using RAP reduces the carbon footprint, reducing the need for virgin aggregates and binder, avoiding the energy consumption and emissions associated with their extraction and processing, especially for binder.

National statistics indicate that increasing RAP percentages can reduce the carbon footprint by 15 to 30 per cent. This aligns with NAPA's EPD simulation on a baseline mixture with no RAP which shows a reduction of about 16 kg CO₂e per tonne when moving from 0 to 50 per cent RAP, equating to a 30 per cent decrease in the carbon footprint.

The use of RAP also reduces cost. Virgin materials (binder and aggregates) account for about 80 per cent of total production costs. Similar to emissions savings from substituting recycled materials, the costs associated with virgin aggregates and binder are avoided.

Despite the benefits, RAP usage has plateaued at around 20 per cent nationally since 2014 according to the NAPA IS-138 annual survey. In response, in 2023 NAPA conducted a survey to identify barriers preventing road agencies from increasing RAP usage through specification adjustments. A key concern is the potential reduction in service life due to issues like raveling and cracking linked to the stiffening effect of RAP binder and overestimating its availability. To address this, most agencies that allow higher RAP content specify the addition of extra virgin binder which increases both production costs and the carbon footprint.

In order to address those concerns and ensure effective RAP binder activation and its full contribution to asphalt mixtures, key factors in RAP management, production, and mix design must be addressed:

- **RAP management:** Implementing robust quality assurance (QA) programs to regularly test binder content, gradation, and moisture are essential for maintaining consistent mix performance. (See QIP-129, [Best Practices for RAP and RAS Management.](#)) »



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- **Production factors:** Balancing production temperatures with material moisture content, production rates, plant setup, and silo storage time ensures adequate heat transfer to RAP which is critical for binder activation.
- **Mix design factors:** Balanced Mix Design (BMD) enables performance testing alongside volumetric requirements, ensuring RAP binder contributes effectively and guaranteeing durability and strength, even with higher RAP content. BMD allows for the optimization of RAP, production parameters, and design factors to secure binder activation.
- **Recycling agents (RAs):** Although RAs offer a promising solution for improving RAP binder activation, their adoption has stalled despite extensive research. Given that the efficiency of RAs depends on their dispersion and diffusion into RAP, future research should focus on field evaluation of RA incorporation methods. Specifically, comparing pre-blending with virgin binder to direct RAP pre-treatment, which has yet to be field-tested, will help identify the most effective method.

USING WARM MIX ASPHALT TECHNOLOGIES TO REDUCE EMISSIONS

Introduced in the U.S. in the early 2000s, warm mix asphalt (WMA) technologies use additives or foaming techniques to lower production temperatures. Additionally, WMA helps reduce emissions of particulate matter (PM₁₀, PM_{2.5}) and volatile organic compounds (VOCs), which lowers worker exposure and reduces binder aging.

The lowest feasible production temperature should be used, but it must still allow sufficient heat transfer for drying aggregates, activating the binder in RAP, and achieving target in-place density.

NCHRP 9-47A research, which included field testing across multiple locations, found that producing WMA at 27°C (48°F) lower than hot mix

asphalt (HMA) can save up to 22 per cent in burner fuel, or 0.64kWh/°C/mT.

Barriers to WMA implementation:

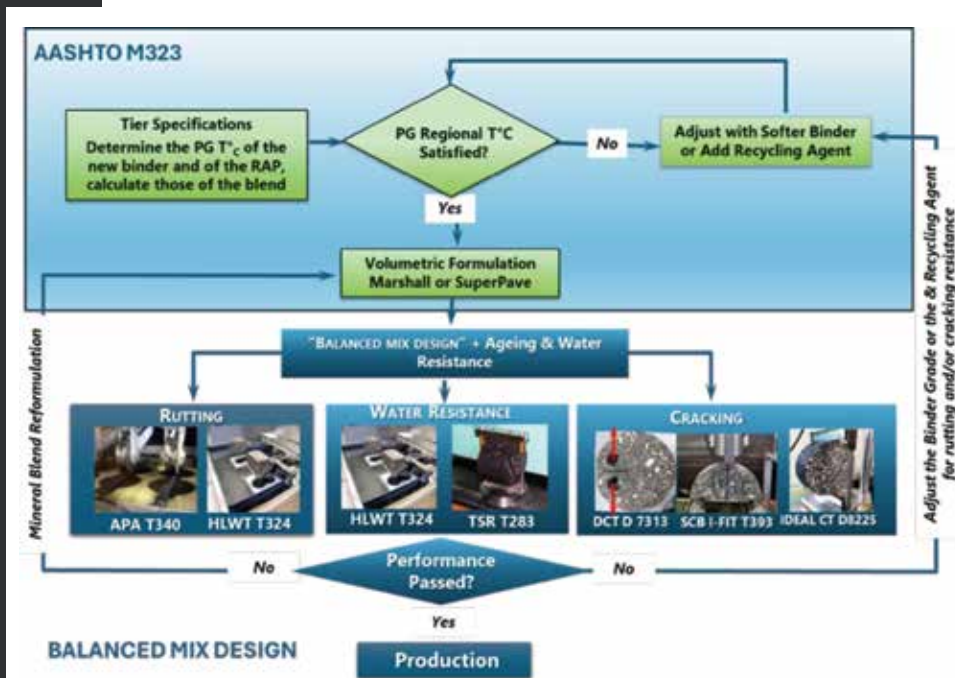
According to the [NAPA IS-138](#), 40 per cent of total asphalt tonnage in 2022 used WMA technology, but only 60 per cent of those mixes had a temperature reduction of at least 5.5°C (10°F) compared to traditional HMA. Furthermore, 72 per cent of those reductions were less than 16.7°C (30°F). This indicates that most “true” WMA mixtures only achieve modest temperature reductions, while 40 per cent of WMA is used as a compaction aid at conventional temperatures.

To address barriers to using WMA at lower temperatures, a [2023 survey](#) was conducted. Agencies are mainly concerned about low in-place density, particularly with long hauls, and moisture issues from incomplete aggregate drying.

OPTIMIZING ASPHALT MIX PRODUCTION GWP AND COST USING BALANCED MIX DESIGN

Balanced Mix Design (BMD) is defined as “using performance tests to balance resistance to both rutting and cracking, on appropriately conditioned specimens to address multiple modes of distress, considering factors such as mixture aging, traffic, climate, and location within the pavement structure.”

While volumetric mix design methods like Superpave (AASHTO M323) remain valuable, especially for estimating the volume of effective binder (Vbe), which is critical for durability and performance, BMD brings additional benefits. In mixtures with high RAP content, Vbe is influenced by the activation of RAP binder and its blending with virgin binder. However, Vbe is not typically monitored as a quality assurance measure during production. That said, BMD cracking resistance tests, such as IDEAL CT or SCB IFIT, are sensitive to Vbe, making them effective indicators of the RAP binder’s real-time contribution during plant production.



AASHTO M323 Superpave and Balanced Mix Design procedures

At the design stage, BMD allows for the selection of cost-effective options while ensuring desired performance outcomes. For high RAP mixes, BMD helps adjust the virgin binder content and grade, or incorporates recycling agents to meet rutting and cracking resistance targets. In quality assurance, BMD can be used to optimize production temperatures and rates, ensuring proper RAP binder activation and any necessary adjustments to the virgin binder. This approach delivers cost savings and potential carbon emission reductions, all without compromising performance.

DECARBONIZING SUBSEQUENT LIFE CYCLE PHASES: KEY STEPS AND RESEARCH NEEDS

Efforts are underway to develop PCR and LCA frameworks around flexible asphalt pavement, enabling a comprehensive assessment of GWP throughout its full life cycle. Historically, the Asphalt Mixture EPD program has operated as a stand-alone program, with gaps in A1 supply chain data. These gaps are now being addressed through the development of standardized PCRs which will ensure consistency across the industry. NAPA's EPDs program will also expand its availability and robustness thanks to the EPA grant (Task 1).

Beyond the A1-A3 stages, subsequent phases including construction, use, maintenance, and end-of-life must also be considered. These efforts will be addressed under the EPA grant program's Task 2, along with contributions from other groups. Collaboration among all stakeholders is crucial for assembling the building blocks of a full GWP assessment across all stages of the pavement life cycle.

CONCLUSION

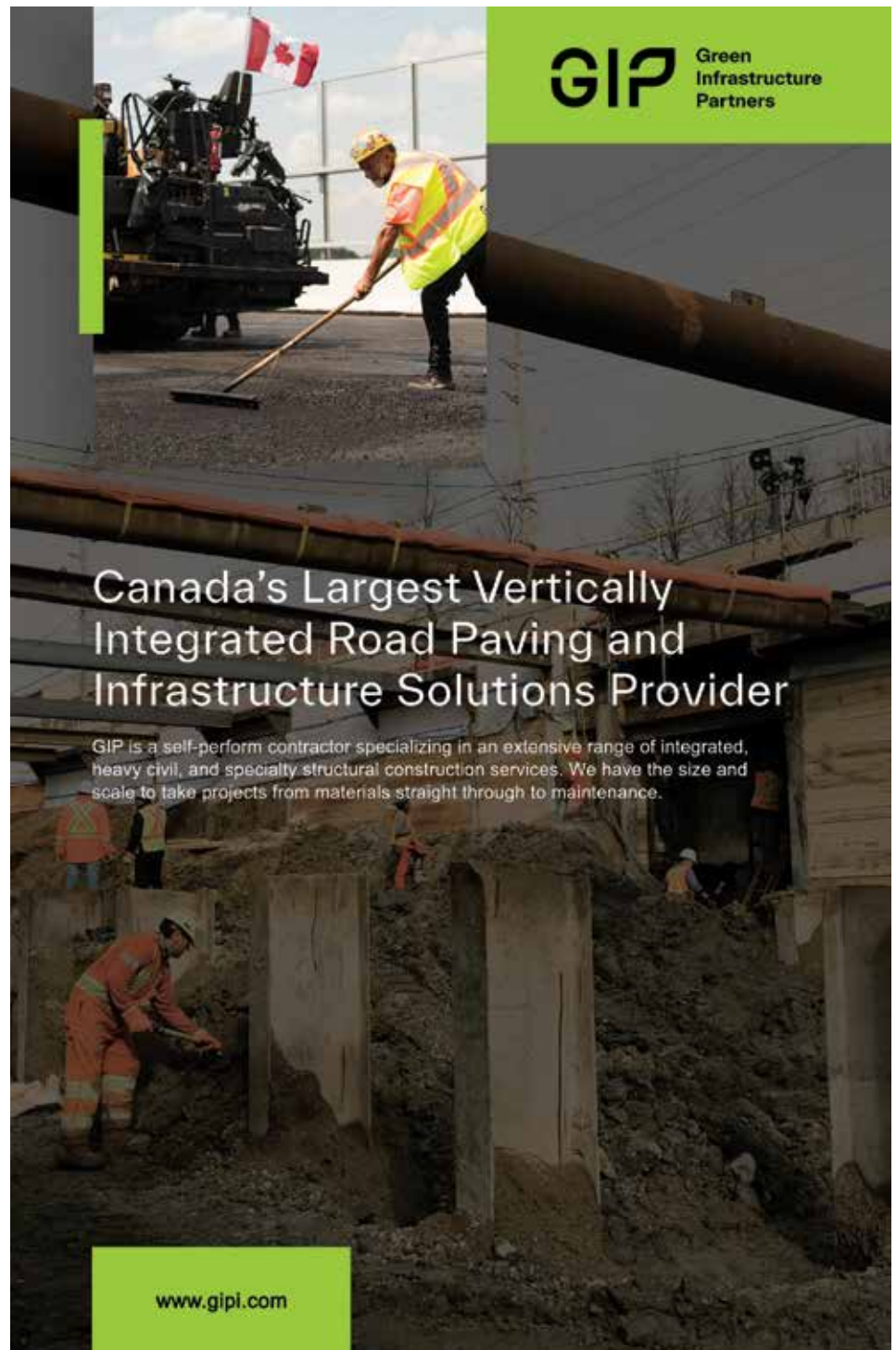
To decarbonize the asphalt industry and ensure a sustainable future, it is essential to establish a comprehensive, standardized framework for LCAs, PCRs, and EPDs. This framework promotes consistency and comparability throughout the entire life cycle of asphalt pavements – from production to end-of-life.

Reducing GHG emissions in the asphalt industry requires collaboration among producers, contractors, and suppliers, driven by initiatives like NAPA's *Road Forward* and the adoption of new technologies such as biobinders and Cold Central Plant Recycling (CCPR). ■

Jean-Paul Fort is Director, Pavement Engineering & Innovation, for the National Asphalt Pavement Association (NAPA).



Scan for the detailed keynote paper.



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Introducing

WOMEN of ASPHALT Canada



Connect, learn, and grow professionally

Women of Asphalt (WofA), an organization dedicated to empowering women in the asphalt industry, has recently expanded its reach to Canada. This expansion marks a significant milestone in the organization's mission to promote gender diversity and inclusivity in a traditionally male-dominated field.

A group of Canadian industry women with decades of experience recognized the need for a supportive network within the asphalt industry in Canada. Ania Anthony, chair of Women of Asphalt Canada, played a crucial role in this initiative. As an active and long-time member of the Canadian Technical Asphalt Association (CTAA), Anthony saw the opportunity for a partnership and mutual benefits to both organizations by creating a Canadian chapter of Women of Asphalt under the CTAA umbrella.

After presenting the concept to several members of the CTAA board, including four women, Ania Anthony and her team formally submitted a written proposal for the board's consideration. This proposal was subsequently approved, leading to the establishment of the Canadian chapter of Women of Asphalt (WofA). The inaugural event for this chapter took place during the CTAA 2023 conference in Charlottetown, PEI.

The Canadian branch of WofA aims to achieve similar goals to its U.S. counterpart, focusing on:

- Increasing female representation in the Canadian asphalt industry;
- Providing networking and educational opportunities; and
- Advocating for gender equality in the workplace.

The 2024 CTAA conference held this year in Edmonton, Alberta, from November 10 to 13, 2024, will provide an excellent opportunity for Women of Asphalt Canada to showcase its initiatives and engage with industry professionals.

Women of Asphalt Canada plans to hold a member event during the CTAA conferences. These conferences are known for their high-quality technical content and excellent networking opportunities among the asphalt industry. The conferences are held in a different province each year,



WofA Canada Leadership Team

by **Leslie Dibling**

providing diverse exposure to the Canadian asphalt landscape.

Women of Asphalt Canada also participated in the Women of Asphalt Mentorship Program in October which aims to tackle specific challenges within the industry. Registration for both mentors and mentees is open from October until the end of November. For further information, please visit www.womenofasphalt.org.

Furthermore, WoA's Selena Lavorato and Leslie Dibling will be featured speakers at the Fall Asphalt Seminar. Their participation underscores Women of Asphalt Canada's commitment to industry engagement and knowledge sharing.

Canadian women interested in joining Women of Asphalt can sign up through the organization's official website and through the Canadian Technical Asphalt Association (CTAA). Membership is free and typically includes access to events, networking opportunities, and educational resources.

The expansion of Women of Asphalt to Canada aligns with broader trends in the Canadian economy regarding women's participation in the workforce. As WofA continues to grow both in Canada and internationally, its impact on the asphalt industry is becoming increasingly significant, contributing to Canada's overall economic growth and innovation potential.

The Women of Asphalt Canada committee is incredibly grateful for CTAA's support and partnership in this initiative. Their vision and leadership have been instrumental in establishing the Canadian chapter, providing a platform for women in the asphalt industry to connect, learn, and grow professionally. This collaboration between WofA and CTAA demonstrates a shared commitment to advancing diversity and inclusion in the Canadian asphalt sector, setting a positive example for the industry as a whole.

Check out the Women of Asphalt on [LinkedIn](#) ■

Leslie Dibling is Director of Organizational Development for AMC Services and Communications Manager for Women of Asphalt Canada.



Ania Anthony



Rielle Haichert



Veronique Szabo



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ONTARIO

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ONTARIO ASPHALT EXPERT TASK GROUP (OAETG): FOUR YEARS OF PROGRESS AND INDUSTRY IMPACT

On June 18, 2019, the Ontario Asphalt Pavement Council (OAPC) took a major step towards engaging technical experts in Ontario, representing all stakeholders by partnering with Imperial Oil's Sarnia Technology Applications and Research (STAR) laboratory to host the inaugural Asphalt Technical Symposium (ATS).

by Dr. Sina Varamini (OAETG Chair), Dr. Pejoochan Tavassoti (OAETG Vice-Chair), and Selena Lavorato (OAETG Secretary)

Held in Sarnia, Ontario, this landmark event brought together industry experts to provide an unbiased platform for technical discussion, fostering collaboration and learning across different sectors. The focus was to talk and ensure mutual understanding on both binder discussions and mix perspectives, facilitating better communication across the industry. The primary goals were to share knowledge, explore new technologies, and develop strategies to improve the design, production, and placement of asphalt pavements.

This invitation-only event created an unprecedented opportunity for industry stakeholders, including contractors, refiners, suppliers, academia, and government agencies, to collaborate on shared challenges. Experts exchanged views on asphalt binder refining, quality and consistency testing, performance testing methods, mix design, and construction practices. The symposium also laid the foundation for the formation of the Ontario Asphalt Expert Task Group (OAETG) in late 2020, which has since become a central group for addressing technical challenges and shaping the future of Ontario's asphalt pavement industry.

THE FORMATION OF OAETG

Following the success of the ATS, OAPC council directors recognized the need for an informal group of dedicated experts and volunteers to continue advancing the symposium's objectives. They wanted to investigate the imposed specs and test methods that needed better understanding and explore their impact on the day-to-day business of running asphalt terminals and/or plants, as well as enforcing quality assurance from the road owner's perspective. This need led to the creation of the OAETG, a group comprising experts from across the industry, including suppliers, contractors, agencies, and academia. The group officially began its activities in early 2020 with a clear mandate: to address ongoing challenges in asphalt binder and mix performance testing and proactively guide the industry through evolving technological advancements.

The OAETG's primary focus initially was on addressing asphalt binder testing challenges in Ontario (e.g., DENT, Extended BBR), before shifting toward understanding newly proposed asphalt mix performance tests by the Ministry of Transportation Ontario (MTO). Performance testing,

while not new to the industry, was not yet widely practiced, creating uncertainty for OAPC/ORBA members in terms of future thresholds and how contracts should navigate through them. Educating members on how these tests could impact the industry was a key objective of the group. Discussions among stakeholders raised awareness of the necessary steps, which was seen as a significant achievement. The task group also sought to ensure Ontario's asphalt industry was prepared for future changes, allowing for a smooth transition to new practices and standards without disrupting business operations or the established supply chain of materials in Ontario.

CRAFTING A 5-YEAR VISION

At the heart of the OAETG's mission is its five-year strategic plan, which outlines its vision for improving asphalt pavement performance in Ontario. The group is driven by the understanding that asphalt pavement performance is not solely about materials, but also about ensuring long-term durability and quality through robust testing methods and strategic planning.

This became particularly relevant as the MTO published a paper at the Canadian Technical Asphalt Association (CTAA) and presented preliminary performance thresholds at multiple OAPC Fall Asphalt Seminars (FAS). The MTO's goal with performance testing was to ensure pavement quality, focusing on rutting, moisture damage, fatigue durability, and low-temperature cracking. Tests like the Hamburg Wheel Tracking Test (HWT) for rutting and moisture damage, the Semi-Circular Bend Test (SCB) for flexibility, and the Disk Compact Tension Test (DCT) for low-temperature cracking were emphasized. However, only a few laboratories in Ontario were equipped with the tools and knowledge to conduct these advanced tests, which prompted the OAETG to advocate for further research and collaboration among members to understand the full implications of these tests. This led to the creation of the OAETG Mix Asphalt Program (O-MAP).

THE O-MAP AND INITIAL FINDINGS

In response to the MTO's findings, including the proposed preliminary rut depth threshold of 6 mm at the time for heavy-duty mixes (e.g., PG70-28XJ Superpave FC2), the OAETG launched a Mix Asphalt Program (O-MAP), initially proposed as an "Exchange Program." O-MAP became a multi-year initiative aimed at exploring the performance of typical Ontario Superpave asphalt mixtures under these new testing frameworks. It was a cornerstone of the OAETG's 5-year plan, aligning with OAPC's broader goals of promoting excellence in asphalt pavement design, construction, and performance.

After reviewing all 16 mixes tested by the MTO, O-MAP focused on testing the stiffest mix possible in Ontario, specifically the SP 12.5 FC2 Surface Mix with PGAC 70-28XJ Category E. This mix type was of particular interest due to concerns about cracking on Ontario roadways and the stringent rut depth threshold of 6 mm proposed by the MTO. Although other

mixes were considered, budget constraints led to the focus on this one mix, with two suppliers volunteering plant-produced samples (referred to as "Mix A" and "Mix B" in Figure 1). This became Round 1 of the study, designed to gauge the current status of mix performance. Round 1 revealed significant variability across different testing labs, indicating that inter-laboratory effects could play a major role in contractual disputes or performance-based design challenges.

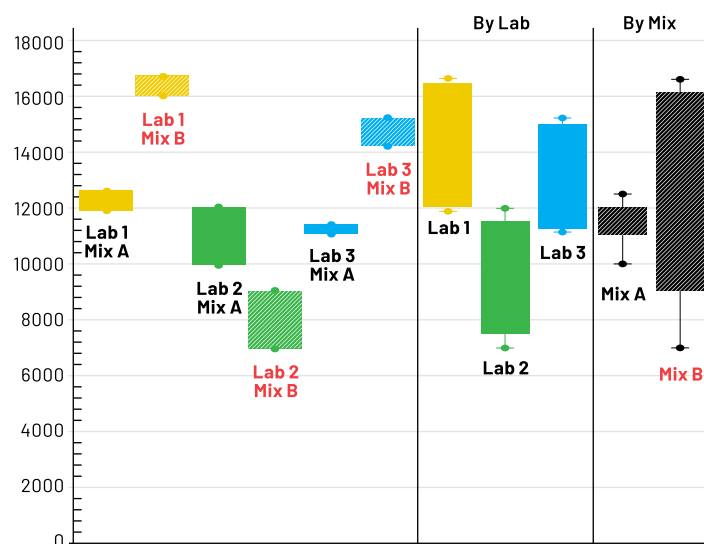


Figure 1 – Results from O-MAP Round 1 illustrating excessive rutting more than 12.5 mm in the Hamburg Wheel Tracking Test for two mixes tested by multiple laboratories, indicating rut failures before reaching the required 20,000 passes at 50°C.

The DCT test results for low-temperature cracking were not of major concern, as Ontario's PGACs are formulated to meet the extended BBR grade loss requirements. However, the SCB and Hamburg tests drew more attention. None of the labs could complete the Hamburg test before 20,000 passes without exceeding the 12.5 mm rut depth. This raised concerns about the MTO's proposed 6 mm rut depth maximum, as these mixes had historically performed well on Ontario highways without field rutting issues. These findings underscored the importance of industry collaboration and knowledge-sharing. The OAETG worked closely with international experts and conducted an extensive literature review, discovering that many agencies worldwide were not yet ready to fully adopt performance-based testing due to equipment limitations, lack of standardized procedures, and concerns about cost implications.

ADDRESSING TESTING VARIABILITY AND CHALLENGES

The significant variability identified in Round 1 led the OAETG to design Round 2 of O-MAP, which focused on understanding the sources of variability in sample fabrication and testing across different laboratories. With limited funding and significant in-kind contributions from OAPC/ORBA members, Round 2 involved using a controlled plant-produced mix from »

the MTO's Superpave Hot Mix Inter-Laboratory Testing Program. This mix was a heavy-duty FC2 mix with PGAC 70-28XJ, potentially designed for high-traffic conditions, Category D.

The results from Round 2 again showed significant variability among laboratories. Performance Space Diagrams (PSD) constructed using HWT and SCB data highlighted discrepancies in performance rankings across labs. Some labs failed to meet MTO's proposed thresholds, while others passed comfortably. This inconsistency raised concerns about the Balanced Mix Design (BMD) approach, particularly if different labs could produce vastly different performance results for the same mix.

ROUND 3 AND BALANCED MIX DESIGN (BMD)

Recognizing the persistent variability from Rounds 1 and 2, OAETG initiated Round 3, revisiting the mix used in Round 1 under controlled laboratory conditions. This time, compacted briquettes were prepared and distributed to testing labs, allowing them to focus solely on cutting, notching, and testing. A BMD exercise was also incorporated into Round 3.

One approach to mitigate uncertainty in future projects could be to assign a single laboratory the responsibility for preparing all the specimens. This would help standardize the preparation process and provide an opportunity to evaluate the factors contributing to differences in laboratory results. For Round 3, the OAETG decided to revisit the mix used in Round 1, but this time, produce it under controlled laboratory conditions and prepare compacted briquettes for distribution to the testing labs, where they would focus solely on cutting, notching, and testing.

The outcome of Round 3 was to emphasize to stakeholders that variability still plays a significant role in these performance tests, posing a risk to both owners and contractors. As the results revealed, variability persisted in key performance tests, although there was a slight improvement over Rounds 1 and 2.

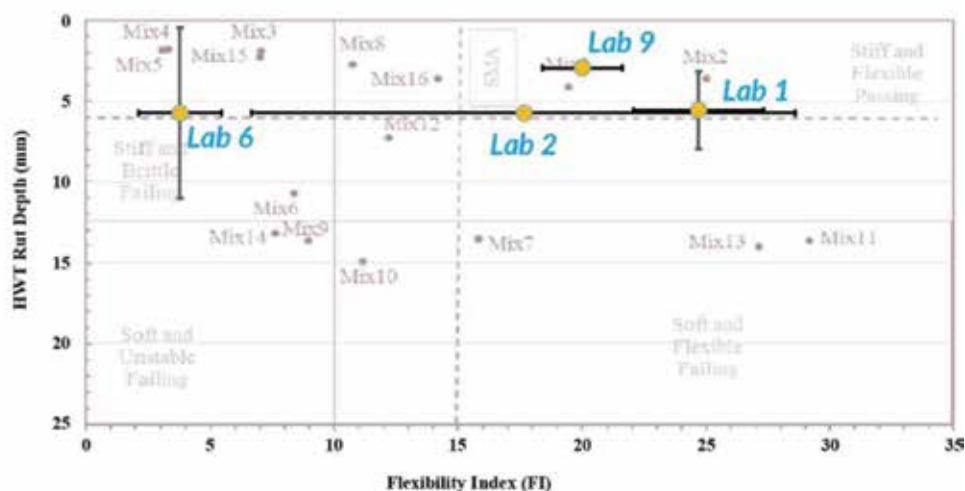


Figure 2 - Results of OMAP Round 2 superimposed on the reference PSD developed by the Ministry of Transportation Ontario, based on the evaluation of sixteen (16) conventional Ontario mixes for rutting performance and fatigue cracking.

The results of the Hamburg Wheel Rut Test in this round were relatively better than in previous rounds but still demonstrated significant variability as shown in Figure 3. Some labs reported excellent performance, with rut depths of less than 6 mm before reaching 20,000 passes, while one lab rated the mix as borderline, barely meeting the MTO's interim threshold of a maximum 12 mm rut depth. Notably, some labs observed specimen failures when tested up to 40,000 passes, while others continued to show excellent performance. This discrepancy raises concerns about contractual acceptance and potential disputes between QC and QA labs. One interesting point is that each lab consistently reported a significant difference between the two sets they tested for HWT, with almost double the rut depths between them for 40,000 passes. The aggregate source for this round was one of the top two performing in Ontario,

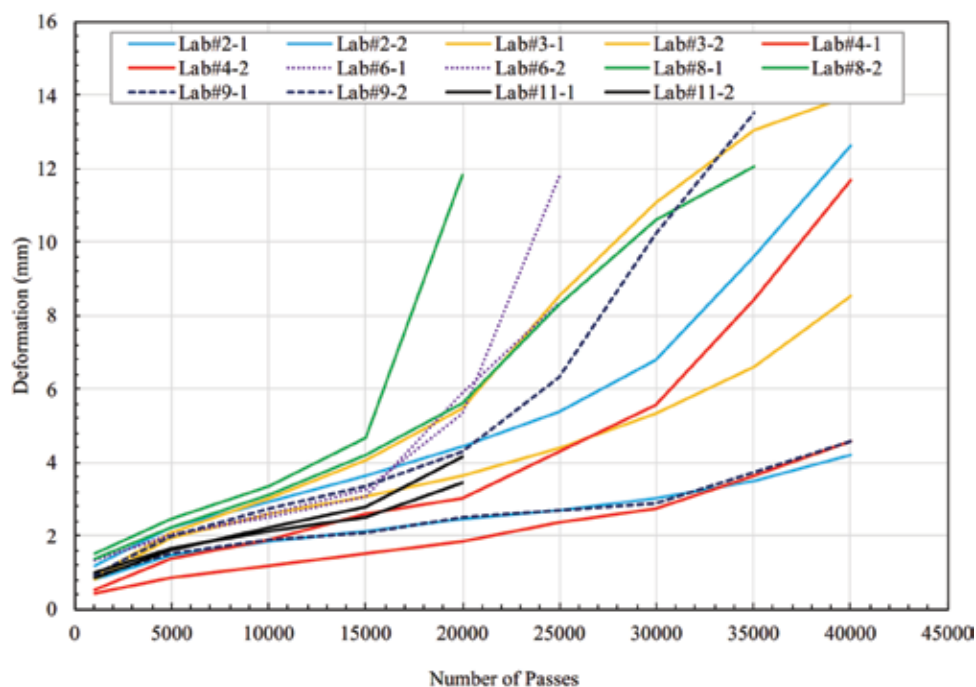


Figure 3 - Results of OMAP Round 3 of Hamburg Wheel Tracking Test.

raising questions about how much greater the variability might be if the aggregate was of lower quality, or if the PGAC grade were PG 64-YY or PG 58-YY. These are questions that remain unanswered.

The Balanced Mix Design (BMD) approach was incorporated into Round 3. For clarification, BMD is not a new concept despite what its name may suggest. Volumetric asphalt design, such as that done under Superpave or Marshall methods, also involves balancing volumetrically driven parameters and indices to determine the optimum asphalt binder content. However, what BMD adds, in light of recent developments, is the use of performance tests or indices to fine-tune this volumetrically-derived asphalt content, adjusting it up or down based on the desired performance outcomes. The Performance Space Diagram (PSD), mentioned earlier, serves as a guide for designers in this balancing process. It's crucial to note that the thresholds used in these performance tests must accurately reflect real-world field conditions, as they directly influence the mix's ability to perform in practice.

In Round 3, BMD involved reducing and increasing the optimum asphalt content of 5.2 per cent by 0.5 per cent. Despite the budget limitations, only a few labs were retained for the Hamburg, SCB, and DCT tests to minimize variability. Hamburg rut depths were on average 3.2 mm at 4.7 per cent asphalt content, 3.6 mm at 5.2 per cent, and 5.5 mm at 5.7 per cent asphalt content. SCB results indicated a Flexibility Index (FI) well above the suggested threshold of 10, with an FI of 17.83 at 4.7 per cent asphalt content and 40.5 at 5.7 per cent. DCT results for all three asphalt contents were well above the minimum threshold of 600, exceeding it by at least 60 per cent.

These results indicated that the mix was well-balanced but raised key questions:

1. Historically, mixes with 4.7 per cent asphalt content could have cracking issues, but the performance tests indicated excellent results. Could this create

problems if proper thresholds are not considered at the network or project level? If cracking occurs, who is responsible—the contractor or the owner?

2. Is this mix receptive to responsible RAP inclusion up to 25 per cent or more? RAP generally imparts stiffness, which could impact SCB and DCT results. If the mix passes the thresholds with RAP, would agency owners accept the mix based on performance indicators? If not, what is the purpose of including performance tests and moving towards BMD? »

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Round 3 findings suggest that performance testing should be reserved for mix design verification rather than field or plant sample quality assurance unless agency owners have comprehensive correction factors for correlating lab results with field performance.

3. Given that binders in Ontario are formulated to be relatively soft to meet extended BBR requirements, should the DCT be tested at different temperatures? No sensitivity was observed when the asphalt content was adjusted by 0.5 per cent, raising concerns that the current testing temperatures for the DCT and SCB may not effectively capture performance related to fatigue and thermal cracking due to the excessive softness of the binder and/or mix at the test temperature. This raises a broader question: how can the balancing act be achieved if the test methods lack sufficient sensitivity?

Round 3 reinforced that variability needs to be controlled before large-scale implementation of performance testing. The findings suggested that performance testing should be reserved for mix design verification rather than field or plant sample quality assurance unless agency owners have comprehensive correction factors for correlating lab results with field performance.

THE FUTURE OF PERFORMANCE TESTING IN ONTARIO

Performance-based testing has the potential to significantly improve asphalt pavement quality and longevity in Ontario, reducing early pavement deterioration and costly repairs. However, the OAETG's work has shown that more effort is needed to ensure consistent application of these tests across the industry.

One of OAETG's top priorities is addressing variability in HWT results which could lead to market disruptions if misunderstood. For instance, if mixes that historically perform well in the field are unable to meet proposed testing thresholds, supply chains could be affected, and businesses might be forced to source more expensive materials, impacting costs and greenhouse gas emissions from transportation.

The OAETG remains committed to fostering innovation and sustainability in asphalt pavement design through performance testing, emphasizing collaboration between

agencies, contractors, and suppliers to ensure a resilient, high-performing asphalt pavement network in Ontario.

FINAL THOUGHTS

The OAETG's five-year strategic plan is a crucial initiative aimed at preparing Ontario's asphalt industry for the future. By prioritizing standardization, innovation, and collaboration, the OAETG is laying the foundation for performance-based testing that will improve pavement durability and ensure long-term success. While challenges remain, the OAETG's efforts are vital in advancing the industry and keeping Ontario at the forefront of asphalt pavement technology.

As an industry, we must consider precision, error margins, and the cost of quality. While performance tests conducted under strict laboratory conditions can measure down to tenths of a millimeter with a caliper, how can we expect a plant to achieve that same level of precision when its control limits are in millimeters at best? It's like the rule of precision: "Measure with a micrometer, mark with chalk, and cut with an axe." If designers are evaluating mix performance with micrometer-level precision, we should aim to measure, adjust, and refine with the highest degree of accuracy and consistency possible.

Simply put, asphalt plants do not have the capability to control factors like rut depth or flexibility index on the fly during production. A more practical approach is to reserve performance testing for mix design approval and verification only, while controlling quality during production through asphalt content (AC), gradation, and other volumetric properties. If these parameters fall outside the specified limits, performance testing can be used for forensic purposes by comparing samples from good sections and those under question to assess relative performance changes.

A more practical approach is to reserve performance testing for mix design approval and verification only, while controlling quality during production through asphalt content, gradation, and other volumetric properties.

We also need to consider the cost of quality. If performance testing becomes just another test to add, we are increasing the cost of quality. While the cost of asphalt might be

calculated in dollar values per subplot, how much is being added for performance testing, binder recovery, binder testing, and other procedures? If these tests rapidly add more than 25 per cent to material or construction costs, what is the return on quality? Are we pricing out certain mix types in favor of alternative solutions when factoring in lifecycle and project costs? These questions need to be addressed through collaborative forums between agency owners and stakeholders, ensuring everyone in the industry is engaged. Open collaboration fosters innovation and builds trust among stakeholders.

As we move toward adopting BMD and performance testing, we should also consider simplifying or relaxing other requirements, such as stringent binder specifications. Adding more tests to the specifications without reducing other complexities creates a challenging environment for designers and may not necessarily lead to better quality roadways.

ACKNOWLEDGEMENT

A heartfelt thank you to the OAETG members and the Oversight Study Team (OST) for their dedication in shaping and sustaining the OAETG's vision over the past four years. The OST's work in analyzing the results and offering expert insights has been invaluable. Special recognition also goes to the testing labs and OAPC/ORBA members for their unwavering support and in-kind contributions throughout this journey.

In particular, a special thanks to Fernando Magisano (OAPC Council Director, MTO-OAPC Hot Mix Asphalt Subcommittee Co-Chair, Canadian Asphalt) for actively participating in all OAETG meetings and ensuring alignment with ORBA/OAPC's vision. A sincere thank you as well to Dr. Amma Agbedor (Asphalt Institute) for her contributions and time as the past secretary of OAETG. Special appreciation to all the testing labs who played a pivotal role and contributed in-kind to the success of O-MAP, including PNJ Consulting, Engtec, Peto MacCallum, Dufferin, GIP (formerly

Coco Laboratory and Aecon), and others not listed here.

OAETG executives would like to acknowledge the OST team members listed in alphabetical order: Dr. Yashar Azim Alamdary (WSP), Mike Aurilio (Yellowline), Dr. Mehran Kafi Farashah (York Region), Prabhdeep Lubana (PNJ Engineering Inc.), Dr. Yamini Nanagiri (Peto Maccallum Ltd.), and Amin Mneina (Good Roads).

It should be noted that OAETG has published the results of both Round 1 and Round 2, which have been consolidated into three technical papers listed below. These papers were presented at the Transportation Association of Canada (TAC) and the Canadian Technical Asphalt Association (CTAA).

1. Ambaiowei, D., Varamini, S., Aurilio, M., Alamdary, Y., [Toward Performance-Based Acceptance of Asphalt Mixtures in Ontario: Industry \(O-MAP\) Preliminary Findings](#). *Transportation Association of Canada*, 2023
2. Ambaiowei, D., Varamini, S., Tavassoti, P., Lavarato, S., Alamdary, Y., [Lessons Learned from Ontario-Mix Asphalt Program \(O-MAP\) – A Critical Look at Hamburg Wheel Tracking Test](#), *Proceedings of the Canadian Technical Asphalt Association Annual Conference*, 2023
3. Tavassoti, P., Wakefield, A., Sanchez, X., Varamini, S., [Performance Evaluation of In-situ and Laboratory Prepared Asphalt Materials: Practical Considerations for Sample Preparation and Testing Methodology](#), *Transportation Association of Canada*, 2022. ■



OAETG members and the Oversight Study Team (OST) conduct a detailed inspection of the fabricated asphalt specimens by PNJ Laboratory, prepared for distribution to participating laboratories for performance testing as part of Round 3 evaluations. L-R: Fernando Magisano, OAPC Council Director, MTO-OAPC Hot Mix Asphalt Subcommittee Co-Chair, Canadian Asphalt; Dr. Sina Varamini, OAETG Chair, CRM Co. LLC.; Prabhdeep Lubana, PNJ Engineering Inc.; Dr. Doubra Ambaiowei, OAPC/ORBA; and Mike Aurilio, Yellowline.

Dr. Sina Varamini, OAETG Chair, is General Manager - Canada at CRM Co LLC; Dr. Pejooan Tavassoti, OAETG Vice-Chair, is Assistant Professor, Jr. Norman W. McLeod Chair in Sustainable Pavement Engineering, University of Waterloo; and Selena Lavorato, OAETG Secretary, is Quality Director at Green Infrastructure Partners.



Diffusion blending and high RAP mixtures – It's still **NOT** just a Black Rock

PART 2

In my article in the last issue of *ASPHALTTopics* (Diffusion Blending and High RAP Mixtures – “It’s Still Not Just a Black Rock”, *ASPHALTTopics*, summer 2024), I talked about the research carried out on blending of the aged bitumen in RAP mixes with virgin bitumen and the effect on the performance of the mix. The research was carried out for the most part using the DSR (Dynamic Shear Rheometer) to measure diffusion rates. Based on the results, Dr. Pavel Kriz, then Asphalt Research Team Lead with Imperial Oil, performed theoretical calculations to estimate the time required for diffusion to blend the bitumen in the RAP with virgin bitumen added to the mix. Kriz concluded that silo storage of RAP mixes would improve the properties of the mix by allowing for more complete blending. As pointed out, these conclusions, while based on laboratory experimentation, were theoretical in nature.

They say that the proof of the pudding is in the eating, and in this regard, a study¹ of the properties of RAP mixes stored in silos was organized. This is going to get a bit complicated, but there are lessons to be re-examined to see how they apply to the path forward. Hang in there – I think it’s worth it.

THE STUDY

Two plants were enlisted in the study and each chose two hot mixes used on regular paving projects. Plant 1 selected an HL 3 surface mix with 15 per cent RAP and an HL 8 base mix with 30 per cent RAP, and Plant 2 selected an HL 3 with 20 per cent RAP and an HL 8 with 40 per cent RAP. Both surface mixes used a PG 58-28 for the virgin bitumen and a PG 52-34 for both base mixes as per AASHTO M323 (2017) recommendations. Mixes were sampled for testing at 0, 1, 4, 8 and 12 hours at both plants and additional samples were collected from Plant 2 at 24 hours. The 0 hr samples were collected from pads of the material immediately after production and the remaining samples were collected from the silos. The silos at both plants were equipped with heated oil circulating jackets to heat the bottom of the silo.

1 Pirzadeh P, Kadhim H, Grant DL, Webb JD, Baaj H, Kriz P. “Impact of Hot Mix Asphalt Plant Storage Conditions on Blending and Diffusion Between Virgin and RAP Binders”, *Journal, Road Materials and Pavement Design* (2019).

by **Sandy Brown**

Samples of the RAP and virgin bitumen used at each plant were also taken for testing.

The 0 hr samples for dynamic modulus analysis from Plant 1 were immediately compacted at the plant's quality assurance laboratory before transportation to the laboratory at the University of Waterloo. All other samples were transported directly to Waterloo for testing. All physical testing was carried out at Waterloo. All collected loose mix samples were refrigerated ($T < 7^{\circ}\text{C}$) at site before transport to Waterloo to reduce additional diffusion between the time of sampling and laboratory testing. The samples were also kept refrigerated until tested at Waterloo.

MIX TESTING

Performance testing was carried out at the Centre for Pavement and Transportation Technology (CPATT) at the University of Waterloo. Details of the testing regime are given in the paper but it is sufficient for this discussion to note that all refrigerated samples were treated in the same way to minimize impact of sample preparation procedures. The samples from each mix at each age of silo storage were tested for dynamic modulus (E^*), rutting (Hamburg Wheel-Track Testing – 50°C , wet), flexural beam fatigue (four point bending) and mix volumetrics. Appropriate AASHTO testing procedures were used for all mix testing.

BINDER TESTING

In addition, samples of the virgin binders, RAP and silo samples were taken to the Technology Application and Research Center of Imperial Oil in Sarnia for binder recovery and then rheological and physiochemical characterization. This included high and low temperature performance grading (for potential aging or hardening), mastercurve development, SAR-AD compositional analysis (saturates, aromatics, resins and asphaltene proportions), Fourier transformed infrared spectrophotometry testing (FTIR testing for possible oxidation after silo storage), estimated diffusion time (see previous article) and diffusion progress estimation (Bonaquist, 2007).

All the binder testing with the exception of virgin binders was carried out on solvent-extracted material according to ASTM test methods and using trichloroethylene (TCE). The recovered samples were examined for excess TCE residue prior to continuing with the testing protocols. The results of the rheology and physiochemical testing represent the properties of fully blended binder. Consequently, the results are more significant to determining the aging of the binder during silo storage.



RESULTS OF MIX TESTING

This study was a very comprehensive examination of the mix performance and binder characteristics and how they develop through silo storage. Before discussing the results of the study, perhaps a review of what would be expected in the performance of mixes and binder for both virgin mixes and mixes made with RAP would be in order. The introduction of virgin binder to hot aggregate in the plant will begin to change the nature of the binder. The binder is expected to stiffen from two effects: evaporation of volatile portion of the binder at elevated temperature and aging, or more precisely, changes in rheology due to changes in the physiochemical properties of the binder. These changes are more rapid at elevated temperature. Prolonged storage in a silo at elevated temperature will exacerbate these changes.

For RAP mixes, previous research has indicated that the properties of the virgin asphalt will initially predominate performance but diffusion allows blending with the stiffer bitumen in the RAP. In simple terms, the overall stiffness of the mix would be expected to increase as diffusion progresses. Diffusion proceeds more rapidly at elevated temperature but nonetheless continues at pavement operating temperatures. Not taking this into account may result in misleading test results depending on the temperature history of the samples. »

All the results indicate that the diffusion between virgin and RAP binder seems to be complete in 8 to 12 hours which matches the theoretical prediction put forward in the original laboratory experiment.

Silo storage results in a more uniform cohesiveness and improved adhesion to the aggregate.



So how do the mix performance results look compared to the expected case? All the results indicate that the diffusion between virgin and RAP binder seems to be complete in 8 to 12 hours which matches the theoretical prediction put forward in the original laboratory experiment. Silo storage provides an opportunity for new and aged binders to blend and seems to be independent of RAP content in the range evaluated. From the mix testing, silo storage results in a more uniform cohesiveness and improved adhesion to the aggregate. It was also observed that higher production temperature and/or lower production rates decreased the time to complete diffusion by allowing for more complete mechanical mixing allowing enhanced contact between virgin and RAP binders.

RESULTS OF BINDER TESTING

The results of the rheology and physiochemical testing were interesting. It was apparent that silo storage of up to 12 hours showed little increase in aging of the binder. In Plant 1, even 24 hour samples from both mixes did not show significant aging and the behavior of the surface mix samples from Plant 2 showed a similar pattern. However, the Plant 2 base mix samples showed a gradual increase in heavier components (asphaltenes) between 12 and 24 hours. As a result, a closer examination was made of the two virgin binders used for the higher RAP ratios in the two plants. The virgin and RAP binder in Plant 1 had a similar physiochemical makeup. This was not the case for those used in Plant 2. There was a higher paraffinic content in the virgin binder used for the base mix. This suggests that the PG 52-34 virgin binder used in Plant 1 was a straight-run refinery produced binder while the PG 52-34 virgin binder used in Plant 2 was likely a softened binder. As a result, there was an increased aging potential of the Plant 2 base course mix. This was confirmed with the FTIR testing which showed an increased carbonyl index for the Plant 2 base mix.

As pointed out in my earlier article, restoring the proper ratio for saturates, aromatics, resins and asphaltene is critical for the long-term performance of mixes. The physiochemical properties of the virgin and RAP binders must be taken into account when designing high RAP mixes. Recycling/rejuvenating agents may be appropriate.

DISCUSSION

It is clear from this study that silo storage allows diffusion to occur quickly. Diffusion will occur in any case but will take longer when not at elevated temperature. But how does all this affect how you consider the black rock debate and the contribution bitumen in the RAP makes to the performance of the pavement. The test results show many changes to the mix during silo storage. Over time, VMA decreases by about 0.5 per cent, VFA increases by about 1 per cent, rutting depth decreases (but sometimes within the variability of the test) and fatigue life

increases, but all seem to stabilize in the 8 to 12 hours range. On the extracted binder side, with the exception of Plant 2 base mix samples, the high temperature grade met 76°C and was within 3°C of the 0 hour value up to 12 hours, the low temperature grade met -22°C and was similarly within 3°C of the 0 hour value up to 12 hours, the chemical composition as measured by SAR-AD and carbonyl index was relatively stable up to 12 hours, and diffusion was essentially complete by 12 hours. All of this is predicted by allowing for diffusion.

It's obvious that mix performance changes over time. When doing a balanced mix design, if we assume from samples taken at the mix design stage without allowance for contribution of some portion of the RAP binder and sufficient sample treatment to allow for diffusion, we may assume that further change will not occur and thus not change the grade of the virgin asphalt. Alternatively, if we treat a portion of the RAP as a black rock (assume the bitumen in the RAP won't affect performance), we may add too much of the softer virgin asphalt. Both alternatives will result in rutting issues in early pavement life. If, on the other hand, we base mix acceptance on the results of pavement performance prediction testing performed on samples taken from production with a suitable treatment to allow for diffusion, we might penalize mixes that will have acceptable performance once diffusion takes place.

As we move to balanced mix design, the temperature history of samples becomes critical in evaluating the results of performance prediction testing.

CLOSING

It's always interesting to look back on previous research as we move forward. This article summarises a technical and detailed research project. It is also an example of a detailed Ontario-based examination of the effect of standard production processes on future pavement performance. As we move to balanced mix design, the temperature history of samples becomes critical in evaluating the results of performance prediction testing. To move forward, we need to innovate and try to do new things, but let's try not to forget the lessons we learned in the past. ■

A.W. (Sandy) Brown, P.Eng., is a geotechnical and materials engineer and consultant.

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RECAP

2024 OAPC ASPHALT TECHNICAL SYMPOSIUM (ATS)

It's hard to believe that only five years ago, a small group of asphalt technical experts from around Ontario and the rest of North America sat in a small conference room in Sarnia to discuss and collaborate on the opportunities and challenges that we faced in the asphalt industry at that time. That was the first Ontario Asphalt Technical Symposium.

In those five short years, we've seen the creation of the Ontario Asphalt Expert Task Group (OAETG) and their focus on critical items such as a better understanding of performance mix testing in Ontario; we've heard from numerous asphalt industry experts on alternative and innovative ways to simplify or improve some of the processes or practices we do today, like the concept of Superpave 5 and a look into RAP practices around the globe; and we've also seen the presence and voice of our agency partners increase as they also share the opportunities, challenges and breakthroughs they've made in the advance of asphalt technology over the years, such as the sharing we heard last year from the City of Hamilton or previously with the Town of Innisfil.

June 11 marked the 6th annual Asphalt Technical Symposium (ATS) sponsored by the Ontario Asphalt Pavement Council (OAPC). This year's event took place at the Scarborough Convention Centre which allowed for a great presentation venue followed by a guided tour of McAsphalt's performance testing laboratory.

The Ontario Asphalt Technical Symposium (ATS) continues to act as a platform to encourage and improve dialogue between stakeholders in Ontario's asphalt industry with the following core objectives:

1. Provide a platform for unbiased technical discussion and sharing;
2. Educate each other on the specific elements of technology necessary to achieve high performing asphalt pavement including materials, design and construction practices;
3. Respectfully share different points of view and visions to improve asphalt pavement quality; and
4. Identify and develop a list of technical topics and agree on next steps to adequately address them.

This year's symposium featured an opening presentation from Amma Agbedor, Canadian & Research Engineer at the Asphalt Institute, with insights into the latest hot topic in the industry: Balanced Mix Design. Though the idea has been around for a little while, interest in it has been growing over the last few years as owners and agencies find a balance between the various challenges they face in proposed mix design requirements. Amma led the group through the basics of the concept, how it can be used and who's adopted already, and different implementation approaches that may work for various adopters.

This session was then complemented by our second presenter of the day, Thomas Harman, Senior Research Engineer at

by **Chris Campbell**

the National Center for Asphalt Technology (NCAT), with a presentation on Balanced Mix Design (BMD) and Field Validation. Tom took us through some of the history of asphalt testing in the U.S. that brought us to why we are at balanced mix design today, which performance tests might be considered in your approach, and which tests are leading candidates for success. We were then given some insights into how you might best implement your BMD strategy and how you can determine if its successful (or not) through test sections and field analysis. Tom provides a great overview on the process, and I recommend you take a look at the presentation through the link below.

The next topic that was shared was a review of the Ontario Asphalt Expert Task Group's (OAETG) progress in its four years of implementation. This presentation, provided by the OAETG chair, Sina Varamini, General Manager of CRM Canada, laid out the objectives and focus of the OAETG in its journey to create a study to support bridging knowledge gaps and providing insights to industry and agency on performance tests like Hamburg, semi-circular bend and disk-shaped compact tension. This study, already in its third round, has supported identification of potential challenges with implementation of performance testing without establishing some benchmark data specific to the mix and climate being assessed.

To build on Sina's discussion, Mike Aurilio, Terminal Manager at Yellowline Asphalt Products, provided insights into O-MAP Round 3 and the future of the OAETG's direction for the O-MAP study. The concept for Round 3 is to understand how to effectively incorporate reclaimed asphalt pavement (RAP) into mixes using the previously explored performance tests and the lessons learned from the first two rounds. From there, the OAETG has proposed a few different routes including various gradations of materials including RAP and the impact of additives like softening or recycling agents.

Our focus was then turned to a binder specific presentation from John Noël, Asphalt Technical Advisor at Imperial Oil, on research done to evaluate different test parameters on their ability to identify best performing asphalt binders. John provided some background into the existing binder testing methodology and some of the proliferation of new specifications that have been proposed to combat perceived shortfalls with the existing system. John presented some insights into what some of the new specifications like R-value and Delta Tc are trying to tell us and how they achieve this. By creating some lab blended examples of possible market available asphalts, good and poor, John showed how these different proposed tests were able to perform in differentiating that quality difference and can be much simpler than existing methods.

Our final presentation of the day was a call to action from Doubra Ambaiowei, Director of Technical Services for ORBA/OAPC, on the need to support higher RAP and warm mix asphalt (WMA) usage in Ontario. A request was put out for any interested road

owners or industry partners to support a Pave-in: Technology Demonstration Day focused on reviewing the challenges, and evaluating and implementing the opportunities, with designing, producing and placing high-RAP asphalt mixtures in Ontario. Since the ATS, plans for the pave-in have solidified – see Doubra's Technically Speaking column for more details.

If you would like additional details on the presentations listed above, they can be found on the OAPC website under [Event Presentations](#).

Having now successfully completed six symposiums, the ATS team looks forward to reviewing feedback from this year's session as we set our sights on the next event in 2025. We hope that all who attended this year's event found it informative and worthwhile, and enjoyed the technical presentations and discussions. If you have any questions about this event, please reach out to Doubra Ambaiowei, ORBA/OAPC Director of Technical Services. ■

Chris Campbell is Americas Asphalt Group & Technical Lead for Imperial Oil and ATS co-chair.

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SUSTAINABLE MIX ADDITIVES LEAD THE WAY TOWARDS A REDUCED CARBON FOOTPRINT



by Dr. Krishna Srinivasan,
Vince Aurilio,
and Dr. Deepak Madan

Roadway development shows no signs of slowing down as departments of transportation look to establish new roads to bolster infrastructure or resurface underperforming existing roads. Estimates place development efforts at all-time highs with predictions that global roadways will grow by 60 per cent by 2050 compared to 2010¹. Even as the industry gears up for this growth, the desire to achieve net zero carbon roadways is fueling a quest for truly sustainable products and solutions.

Asphalt and bitumen additives present opportunities to enhance performance while also driving down carbon emissions through several different avenues. Sustainable additives can enable contractors to leverage higher percentages of recycled materials, lower production and compaction temperatures, enhance performance without the use of petrochemicals, and reduce energy consumption while bolstering workability. Many such additives can be used synergistically to help achieve established net zero carbon goals.

APPROACHING REDUCED CARBON EMISSIONS FROM CRADLE TO GATE

In recent years, responsible additive suppliers have focused on sustainability and have been exploring opportunities to lower the overall Global Warming Potential (GWP) of their product portfolio. This can be achieved through conscientious efforts to source renewable materials and energy, reduce energy consumption during manufacture and transport, and optimize operations. Such an approach allows suppliers to take responsibility for their own environmental impact. A typical analysis includes a review of the environmental impact from cradle to gate including raw materials (A1), raw material transport (A2), product manufacturing (A3), and product transportation (A4).

Also factoring into the conversation around sustainability is the concept of carbon sequestration analysis. Bio-based additives offer additional opportunities to help reduce the carbon footprint. Carbon sequestration refers to the process where plants capture

carbon dioxide from the air during the photosynthesis process. As cultivated crops are harvested and the bio-oils are extracted, they are captured in the bio-based oil additives which ultimately sequester the carbon dioxide into the roadway. Carbon sequestration calculations can help provide a more complete picture of a product's sustainability impact.

As additive suppliers within the bitumen industry develop Environmental Product Declarations (EPDs) for their products, they have been reluctant to share EPDs in an easy and transparent fashion. Citing reasons from calculation complexity to lack of required structured data and associated costs, a number of additive suppliers have elected not to openly share EPDs.

A few suppliers have realized the industry is increasingly relying on understanding the carbon footprint for the entire supply chain. To assess the impact of not only production but also product carbon emissions, contractors need access to reliable, transparent data.

Sripath has led the way in providing easy and transparent access to its independently verified EPDs and Sustainability Reports. EPDs and Sustainability Reports for the following Sripath products are accessible on Sripath's website, providing contractors with a critical tool needed to achieve their net zero carbon goals: (a) ReLIXER®, an asphalt rejuvenator^{2,3}; (b) PGXpand®, a bitumen-friendly polymeric-additive^{4,5}; and (c) NuMIXER®, a bitumen softener^{6,7}.

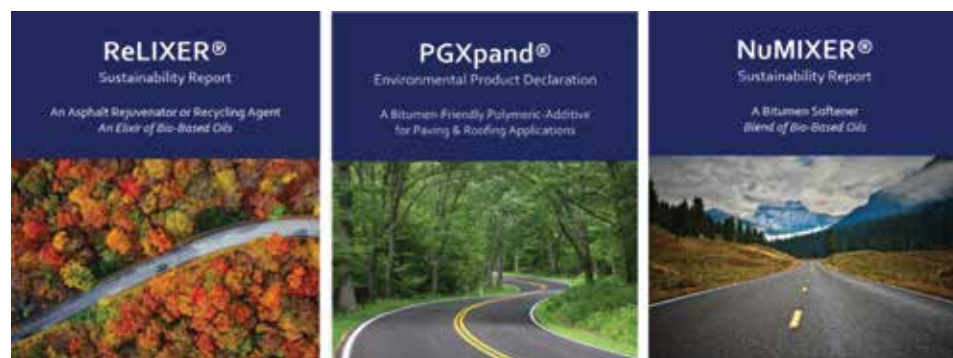


Figure 1: Sripath makes its EPDs and sustainability reports easily accessible

ANSWERING THE CALL FOR INCREASED USE OF HIGH-RAP MIXES

Asphalt is fast becoming one of the most recycled materials in the world, and with good reason. The use of reclaimed asphalt pavement (RAP) has been directly correlated with a reduction in greenhouse gas (GHG) emissions. In 2019, expanded use of RAP was credited for reducing GHG emissions by 2.9 metric tons. Further, studies have shown that increasing RAP usage by a single percentage point can reduce emissions by 0.14 MMT CO₂e, which is equivalent to emissions by 30,000 passenger vehicles per year⁸.

There are challenges facing contractors looking to implement high-RAP mixes with more than 25 per cent RAP. By its very nature, the aged binder in RAP lacks the functional characteristics needed to act as an effective binder. Over time, binders oxidize and change both physically and chemically, affecting stiffness, binder grade, compatibility, and durability among other characteristics. As a result, many agencies arbitrarily cap the quantity of RAP permitted in mix specifications.

However, the introduction of an effective rejuvenator or recycling agent can significantly increase the amount of RAP that can be incorporated into a mix without sacrificing performance. A rejuvenator not only reduces viscosity of the aged bitumen but also helps

rebalance and restore the functional properties of the aged RAP binder. Doing so enables contractors to use much higher RAP content, even up to 100 per cent, in their mixes.

A number of benefits to using high-RAP mixes become quickly apparent. Using higher levels of RAP reduces the need for virgin binder and fresh aggregate in the mix. This helps to conserve natural resources while also cutting costs. Notably, 70 per cent of roadway costs are tied directly to material expenses. In the U.S. alone, an average use of 21.1 per cent RAP in mixes saved \$7.80 per ton compared to virgin material use¹².

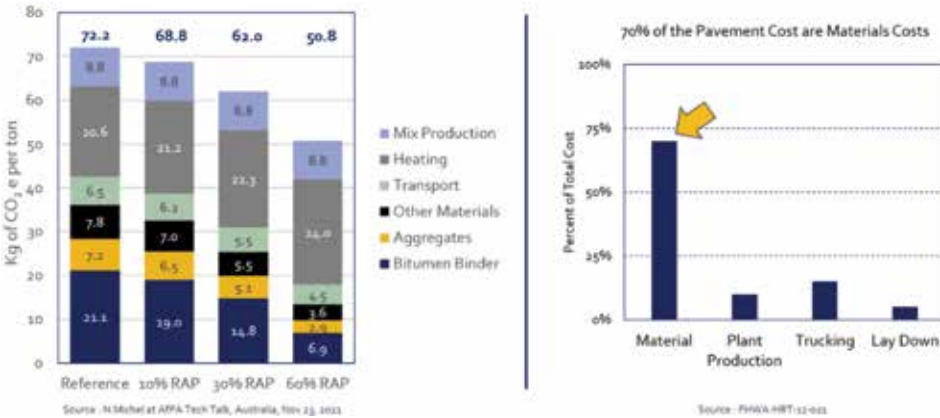


Figure 2: Higher RAP usage results in lower carbon emissions and lower material costs

ReLIXER, is formulated to enable the use of high-RAP mixes that meet performance requirements while supporting contractor sustainability goals. The recycling agent is designed to soften asphalt, adjust grade, and aid compaction and roadway durability. In addition, ReLIXER is highly dosage efficient, reduces the need for virgin binder, and helps reduce cost. Independent testing using balanced mix design concepts have repeatedly demonstrated that ReLIXER also delivers roadways with desired performance and long-term durability.

In testing the IDEAL-CT Index for 0 per cent, 30 per cent, and 50 per cent RAP mixes, samples dosed with ReLIXER demonstrated better fracture toughness even after simulated aging. The test demonstrated high-RAP mixes dosed with an effective rejuvenator can perform better or as well as mixes with no RAP or low RAP.

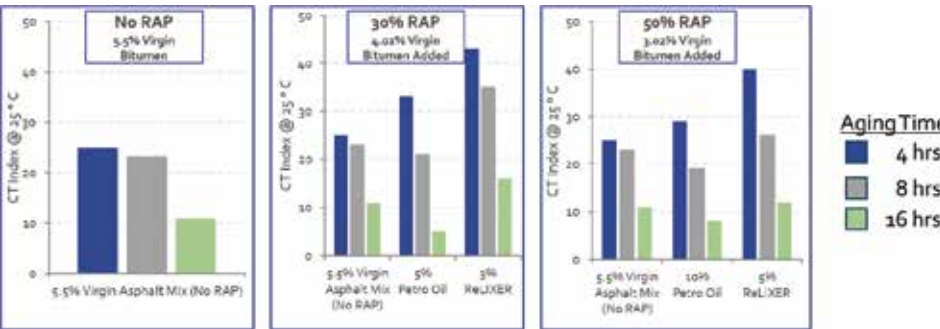


Figure 3: IDEAL CT index of aged high-RAP mixes dosed with rejuvenators

In consideration of Carbon Sequestration (S1) Analysis, ReLIXER exhibits a GWP of -1.677, demonstrating the sustainability characteristics of the bio-based oil blend. This negative contribution helps contractors reduce their overall carbon footprint and meet their own net-zero carbon goals. Additionally, ReLIXER helps contractors lower the overall mix cost, maintaining both desired short and long-term properties while targeting improved sustainability goals.

ReLIXER® REJUVENATOR Impact on Global Warming Potential (GWP): A1 + A2 + A3 + S1				
Impact	A1 – A2 Materials	A3 Manufacture	S1 Carbon Sequestration	A1+A2+A3+S1
GWP100 kg of CO ₂ eq. per kg ReLIXER	0.429	0.427	- 2.533	- 1.677

Table 1: Impact of ReLIXER on GWP

LOWERING PRODUCTION AND PAVING TEMPERATURES HELPS REDUCE GHG EMISSIONS

Another approach to reducing carbon emissions produced in roadway development projects is to reduce the energy consumption required for a particular project. Traditional methods for laying roadways have relied on high production and compaction temperatures to ensure long-term performance. However, the use of warm mix additives is on the rise as contractors look to not only lower emissions but also provide safer working conditions.

An effective warm mix additive can help lower the asphalt mixing temperatures. This not only lowers carbon dioxide emissions by anywhere from 15 to 70 per cent but also reduces both energy and fuel consumption by between 20 to 35 per cent⁹⁻¹¹. These additives also help reduce the paving temperature, further reducing energy and fuel consumed.

PHALANX®, Sripath's recently released warm mix additive, has already made headway in demonstrating that an effective warm mix additive can be sustainable without sacrificing roadway performance. Initial testing by the Royal Melbourne Institute of Technology, Melbourne (RMIT) demonstrated a low dosage of just 0.25 per cent PHALANX improves compactability when compared to other warm mix additives even at temperatures as low as 115°C. PHALANX shows these additives can be part of the solution for contractors looking to create safer, more sustainable job sites. »

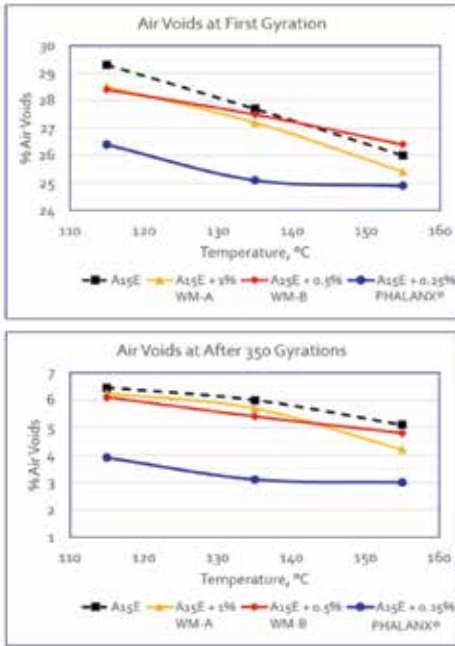


Figure 4: PHALANX® dosed PMB (A15E) mixes showed higher compaction even at 115°C

Importantly, choosing a warm mix additive to lower energy consumption is only part of the sustainability equation. As an added advantage, PHALANX is also an environmentally friendly warm mix additive, with a significantly lower impact on greenhouse gas emissions when compared to traditional additives.

REDUCING CARBON FOOTPRINT OF PMBs

Increasingly, contractors are incorporating polymer modified bitumen (PMB) into roadways to improve performance and durability. Traditional polymers used in the industry can contribute significantly to the carbon footprint. Sripath's PGXpand, a bitumen friendly polymeric additive, has a significantly lower GWP when compared to traditional polymers. Further, it is highly dosage efficient, further helping reduce the overall carbon footprint.

PGXpand is a uniquely engineered molecule designed to enhance high-temperature performance while retaining low temperature properties of the mix. The result is an improved softening point and paving grade, helping to make PMB mixes with exceptional fatigue and rutting resistance. Adding just 1.5 to 3 per cent of PGXpand to a base binder PG 64-22 improves the softening point and also lowers viscosity and penetration values.

Bitumen-Friendly Polymer Modified Bitumen				
With PGXpand	Softening Point (°C)	Penetration (dmm)	True Grade (°C)	Viscosity @ 163°C, cps
Base Binder PG 64-22	48	67	66.8 - 26.1	450
1.5%	98	45	85.3 - 25.1	402
2%	122	40	95.0 - 25.0	384
3%	123	39	95.0 - 25.0	370

Table 2: PGXpand dosed PMBs demonstrate high-performance properties

Incorporating this low dosage, highly effective additive has further sustainability benefits. As an easy-to-blend product, PGXpand allows for the use of low shear mixers, shorter blending times, and lower blending temperatures. All of this results in lowering energy consumption for contractors, helping them work toward their carbon emissions goals. Inherently, PGXpand is more ecofriendly with a calculated GWP of 3.270 kg of CO2 equivalent per kg. The GWP number of PGXpand is significantly lower than the GWP value of 4.5 to 5.0 for traditional elastomers, a value often-cited by experts in the industry; however, elastomer manufacturers have, so far, not made their EPDs easily accessible.

PGXpand® BITUMEN-FRIENDLY POLYMERIC-ADDITIVE	
Impact on Global Warming Potential (GWP) Based on TRACI 2.1 Methodology	
Impact	A1 + A2 + A3 + A4
GWP kg of CO ₂ eq. per kg of PGXpand	3.270

Table 3: Impact of PGXpand on GWP

ECO-FRIENDLY BITUMEN SOFTENERS

When working to adjust the grade or properties of bitumen, manufacturers have the opportunity to choose products that support their sustainability goals. With regard to bitumen softeners, green bio-oils stand out as a more environmentally friendly alternative to traditional petrochemical products.

Sripath's NuMIXER helps manage viscosity of bitumen, improves low-temperature properties, and improves fracture toughness and fatigue resistance. As a uniquely engineered green bio-oil, NuMIXER accomplishes all of this while also being sustainable. NuMIXER achieves a -1.597 GWP when accounting for carbon sequestration in the manufacturing process. The additive also remains stable at ambient temperatures, helping lower energy consumption required during shipping.

NuMIXER® REJUVENATOR				
Impact on Global Warming Potential (GWP): A1 + A2 + A3 + S1				
Impact	A1 - A2 Materials	A3 Manufacture	S1 Carbon Sequestration	A1+A2+A3+S1
GWP100 kg of CO ₂ eq. per kg ReLIXER	0.608	0.328	- 2.533	- 1.597

Table 4: Impact of NuMIXER on GWP

LOOKING AHEAD TO A SUSTAINABLE FUTURE

Contractors are positioned now more than ever with the tools they need to formulate asphalt mixes that meet desired performance levels without forfeiting sustainability. Key to their success is the ability to obtain the information needed to help them make the best decisions, based on both performance and GWP data. Ultimately, the best additives are those that not only deliver on performance but also reduce costs, improve worker conditions, and help reduce the carbon footprint. ■

Dr. Krishna Srinivasan is President and Vince Aurilio is Senior Technical Director of Sripath Technologies LLC; Dr. Deepak Madan is President of Danik Innovations LLC.

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Spinello gets next generation involved at Crupi

Carmen Spinello's father and some of his uncles worked for D. Crupi & Sons Limited, so it was almost inevitable that he would start his working life at the company as well. Starting as a trainee on a grinder when he was 20 years old, he gained experience and within a few years he was heading up a patching crew. That crew grew larger as the years went by, as did the jobs, until in 2000 he became general superintendent at Crupi.

"I have never wanted to go somewhere else. It's a good company to work for and lots of good people work here. Everyone works hard and respects each other," says Spinello. "We have the opportunity to do nice work – work that's recognized. I've been lucky to work on big projects like the 401, DVP and Gardiner, and the transit systems."

"Carmen is the definition of being a life-time dedicated employee. He is a very large piece of the operation and everyone respects what he does," says Dominic Crupi, Vice President of D. Crupi & Sons.

As general superintendent, Spinello takes care of the paving operations, scheduling and managing the crews and overseeing the paving work. It's a lot of juggling, but Spinello says the people he works with and the teamwork make his job easier.

"Carmen is always there and the person we rely on to make sure that everything runs smoothly. He makes sure the customer is taken care of and happy with the service received, and does what he needs to do to get the job done," says Crupi.

Spinello credits his mentors including Cosimo Crupi, Domenic Passalacqua, Michael Doherty and Anthony Servadone for helping him to get where he is today. For his part, he likes to give young people an opportunity to get into the industry.

"I like to get a lot of young people to train and learn the business; to give them opportunities to jump on machines

and give them the chance to do what I've done here. To get them into the business, it's important to talk to them and show them what we do and their future in the business. I've seen people start as labourers or flaggers who got onto a machine and who are now full time spreader operators. Give them a chance to see what business is about and they'll stay and grow with the business," says Spinello.

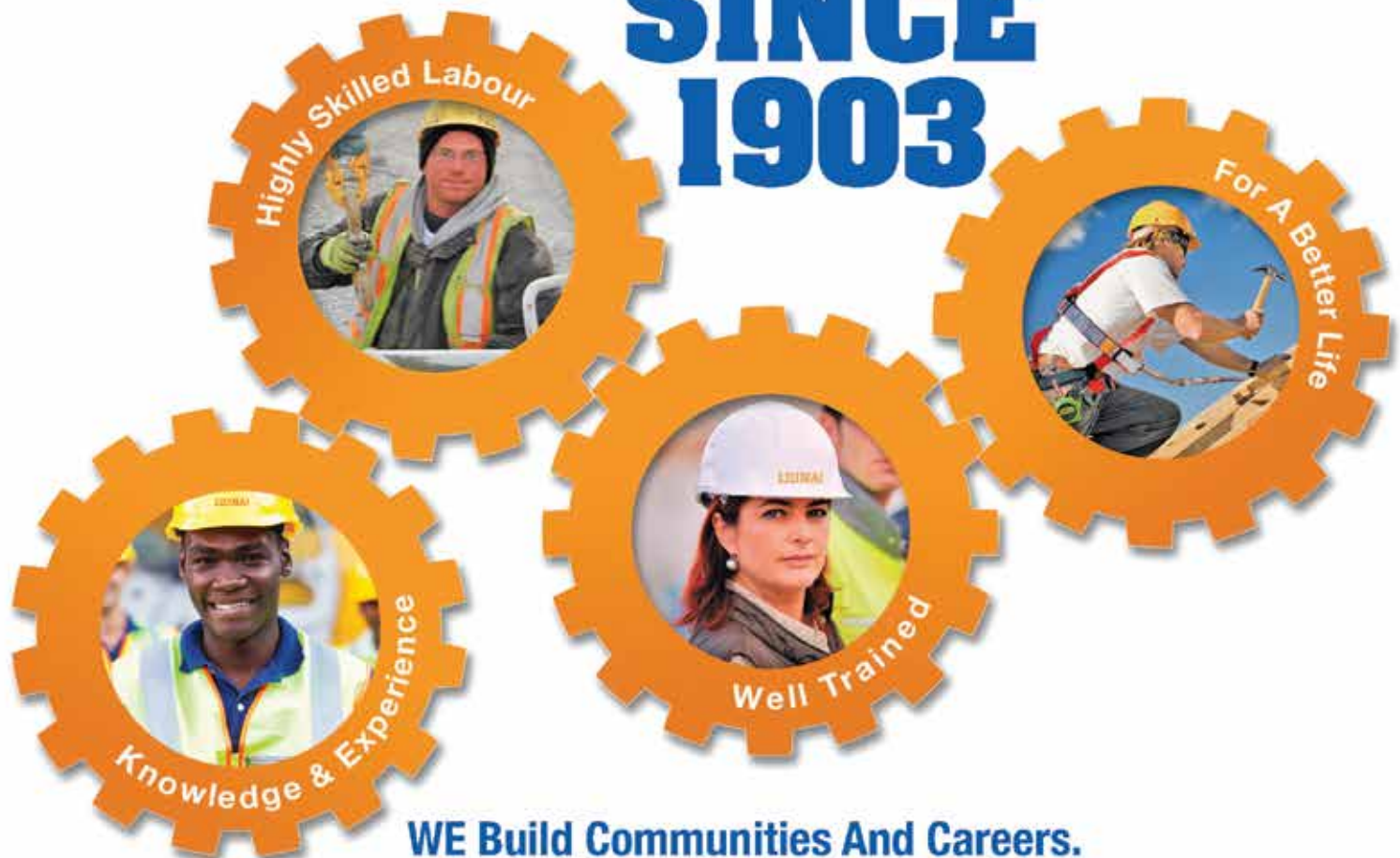
"Our business is very family oriented and we want people to feel part of our family. Carmen is the definition of that ideology and an integral part of the Crupi family. I don't have enough good things to say about him. He's a huge part of what we stand for as an organization and wanting people to be successful, safe, and happy to come to work every day," says Crupi.

"If you were to use such descriptive phrases as dedicated and customer-oriented to describe a hard worker in Ontario road building, the name Carmen Spinello would immediately be part of the conversation," says Michael Doherty, Senior Manager for Engtec Consulting Inc. "It was my honour to have Carmen work for and with me for many years, and his attention to detail and impeccable memory were invaluable in executing projects and maintaining customer relationships – the backbone of our industry. There was not a construction site Carmen did not visit, whether that was day or night, weekday or weekend. To nominate him as an Unsung Hero was a no brainer, and he wholly deserves the accolade."

Looking to the future, Spinello wants to continue in his role and keep growing with the company. "I like to see a lot of young faces and help a lot of young people out. They are the next generation of our industry," says Spinello. ■

Lara Henry is a communication specialist and editor of ASPHALTopics.

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TECHNICALLY SPEAKING

Doubra C. Ambaiwei
Director, Technical Services

an official certification program, with emphasis on expanding the scope to include quality, and promote increased buy-in from customers, owners and ORBA/OAPC members. The specifics of this win are discussed in the Environmental Essentials feature in this issue of *ASPHALT*Topics.

Further on the focus on quality, Ontario is on a continuing quest to advance the role of mix performance testing and build proficiencies with the Balanced Mix Design (BMD) concept. Through this year's Asphalt Technical Symposium (ATS), OAPC has facilitated a transfer of knowledge and understanding of experiences and perspectives to steer Ontario towards realizing the benefits of BMD implementation, and further stimulate a focus on performance testing in contracts and agency specifications. Special thanks to our collaborators from the Asphalt Institute (AI) and National Centre for Asphalt Technology (NCAT) who helped set the stage for our understanding of local problems and solutions, and a brainstorming workshop on **Paving the Way to BMD Implementation with Trust and Collaboration**. The highlights of the 2024 OAPC - ATS are recapped in this issue of *ASPHALT*Topics.

SUSTAINABILITY - To promote asphalt strategies, initiatives and processes that will benefit the environment, improve society, and provide an overall economic benefit, OAPC is keen on developing a sustainability plan to meet government's commitment to net-zero by 2050. The OAPC Environment Committee has begun an overview for a sustainability plan which revolves around:

- Steps to establish sustainable development;
- Where we can reduce the impact of our industry's activities;
- Examining and applying low carbon solutions;
- Educating decision makers to consider environmental impacts; and
- Providing solutions that protect our natural resources through the adoption of a circular economy. »

2024 OAPC priorities in review – picking up steam!



The OAPC directors typically start off each year with clear and strategic priorities coupled with tactics to advance the council's vision and mission as it impacts on the quality and continued choice of asphalt for Ontario's roadways. My responsibility is to engage with all apparatuses of ORBA and the council, industry stakeholders and collaborators, and our provincial and municipal partners, to ensure both technical and operational successes around each strategic objective. This article takes stock of our progress to date.

QUALITY – OAPC's focus on advancing quality asphalt pavements and pavement solutions to all customers in Ontario has resulted in engaging a consultant to develop a framework for the **potential certification of asphalt production facilities** in Ontario. It is expected that the current Trillium Award Program could be transitioned into

The 2024 OAPC Fall Asphalt Seminar (FAS), themed **Pathways to a Sustainable Future for Asphalt Technology**, will draw perspectives to the above-mentioned. Through a collaborative partnership with the National Research Council Canada (NRC), ORBA/OAPC has engaged a sustainability consultant, WAP Sustainability LLC, to further the capabilities of Ontario asphalt producers with developing Environmental Product Declarations (EPDs) for asphalt mixtures. This partnership with the NRC is expected to enhance the sustainability of the Canadian construction sector, promote best practices in Life Cycle Assessment (LCA), and support the industry's move towards

low carbon pathways. Additional highlights on execution of this important focus will be presented at the FAS.

Another important highlight to the sustainability gains is the council's priority to encourage provincial and municipal specifications to optimize the use of reclaimed asphalt pavements (RAP) and warm mix asphalt (WMA). We are excited to report a collaborative effort with York Regional Municipality, NRC, and Ingevity in a **2025 pave-in to demonstrate a high-RAP warm mix trial**. The experimental plan seeks to demonstrate that it is possible to design, produce and place surface and intermediate-type Superpave mixes incorporating a high-RAP warm mix without compromising the specified consensus properties and volumetric characteristics, their overall laboratory and in-service performance (to include section instrumentation), as well as evaluate the impact of using rejuvenators in recycled mixes. The specifics toward realizing this objective will be presented at the FAS.

CODES, STANDARDS, SPECIFICATION, AND REGULATION REVIEWS – The HMA Technical Working Group and HMA Subcommittee continue to proactively participate in the development, review and harmonization of achievable specifications and regulations industry-wide. These efforts cut across several pertinent provincial and municipal specifications issues, addressing subjects such as the OPSS municipal and provincial specifications (313, 310, 1101, and 1010), EPDs in MTOs Green Pave Rating System, mix performance testing, grit sand specifications, HMA optimization, BMD, responsible RAP usage, specification harmonization, and more. Most of these important topical discussions have either featured in ORBA's webinar series and/or have been advanced through open stakeholder dialogue forums and conferences, to ensure everyone is informed, engaged and educated.

On the regulatory side, ORBA continues to collaborate with the Ministry of Environment Conservation and Parks (MECP) to agree on a consistent approach



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GCE...as innovative as the road is long.

for estimating silica emissions from various input materials and to prepare a table of silica laboratory analysis for material types by geographic region. This effort advances the Council's priority to improve the Environmental Compliance Approval (ECA) process for asphalt plants, and we are pleased to report that the MECP is now set to complete a Technical Bulletin to promote a level playing field and consistency in ECA applications. **We expect the bulletin, which details an alternative procedure for silica data sampling, will be released.** At that time, the specifics will be detailed in an *ASPHALT* Topics article, and possibly an educational webinar, as we aim to ensure that representative data is collected across all regions.

RESEARCH AND EDUCATION – This year, OAPC continued its research and development investment commitment by supporting the **third round of the Ontario – Mix Asphalt Program (O-MAP) performance testing studies** being carried out by the Ontario Asphalt Expert Task Group (OAETG), an initiative of the OAPC – ATS. This testing program is intended to identify any issues and challenges should performance-based acceptance of asphalt mixtures become the realm of contractual acceptance in Ontario. A comprehensive summary of the work completed by the OAETG to date is detailed in this magazine publication, with a presentation focused on the O-MAP Round 3 study findings due at the Fall Asphalt Seminar (FAS) on November 28. **DO NOT MISS IT!**

In accordance with vision and mission goals, OAPC advanced several topical [webinars](#) discussions, focused on:

- International Experiences with High-RAP Content Mixtures (webinar on September 25)
- Municipal Paving Inspector Checklist (webinar on July 17)
- The Importance of Borderline Specifications for Asphalt Production (webinar on May 29)

OAPC also mapped a path to asphalt excellence at the 2023 Good Roads Conference in April, placing emphasis on the [Top 10 List – Ways to Get More Durable HMA Pavements](#). Earlier in November, we carried forward the quality of asphalt message, focused on responsible RAP use, and the importance of a harmonized HMA specification to the Municipal Engineers Association (MEA) conference. These technical briefings and resultant dialogue were intended to better connect with our municipal counterparts since we have departed from the traditional Partners-in-Quality Road Tour Seminar. Our Spring Operations Seminar 2.0 also featured topical issues impacting the asphalt industry, covering updates around health and safety, paving operations (new screed system) and equipment, the environment (6th Environment Practices Guide), including recognitions around the industry's future (Roads Scholarship Program), as well as plant operational excellence.

ADVOCACY AND STAKEHOLDER RELATIONS – In accordance with the priority objective to be the leading voice of asphalt pavements across Ontario, OAPC, with support from the ORBA leadership, has continued to engage the Ministry of Transportation Ontario (MTO) on **End Result Specification (ERS)** reviews and other bituminous and/or pavement specification implementation plans. Likewise, we continue to engage and grow relationships with municipalities in Ontario, their engineers, and improve our partnerships with Good Roads.

Ontario's path to a sustainable future for asphalt technology is picking up steam. We are building on the gains of small wins, great accomplishments, and open dialogues. To our leaders, stakeholders, partners, collaborators and friends, thanks for doing what you do, without which these positive gains would be non-existent. **WHAT A YEAR WE HAVE HAD! ■**

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ENVIRONMENTAL ESSENTIALS

Doubra C. Ambaiwei
Director, Technical Services

Transitioning toward certification of asphalt production plants in Ontario

WHY CERTIFY ASPHALT PLANTS?

The production of high-quality hot mix asphalt (HMA) is dependent on many factors. Important among these is the capability and condition of the producer's hot mix facilities. Facilities capable of properly and accurately handling, proportioning, mixing and discharging, storing and dispatching the hot mix are essential to any HMA operation. Certification of the capabilities of production facilities constitutes one means wherein a responsible HMA producer can assure customers of their interest and willingness to supply uniform HMA of the quality specified. However, this requires the full co-operation and concern of all parties involved. The quality objectives for asphalt production **MUST** be seen as a partnership, with all stakeholders collectively working together. Producers **MUST** be committed to an open-door policy, encourage plant tours, and be good ambassadors of the industry. Owners **MUST** take responsibility and ensure the proper implementation of any specified oversight specification requirements and/or functions.

DEVELOPING AN ONTARIO ASPHALT PLANT CERTIFICATION (OAPC) PROGRAM FRAMEWORK

The need to push forward environmental stewardship and better quality asphalt in Ontario has motivated a desire to transition the current OAPC Trillium Award Program into

an official asphalt certification program, with emphasis on expanding the scope to include quality and promote increased buy-in from customers, owners and ORBA/OAPC members. This objective became necessary following recommendations from the OAPC - Trillium Ad Hoc Committee (comprised of industry stakeholders and municipal partners), and a 2023 Trillium stakeholder survey that emphasized a need to “**focus on quality outcomes, seek ways to restore confidence, and collaborate on RAP pilot projects that advance the success of experiences to show that the durability of HMA is not compromised by incorporating and/or increasing the amount of RAP that is currently allowed.**” These survey outcomes were highlighted at the 2023 Good Roads Conference, 2023 Municipal Engineers Association Conference (MEA), and 2023 Fall Asphalt Seminar.

Consequently, on November 24, 2023, a Request for Quotation (RFQ) was issued for the framework development for an **Ontario Asphalt Plant Certification (OAPC) Program** with Corfinium Solutions Inc. becoming the approved consultant via a resolution of the council directors on July 9, 2024. The decision of the council was facilitated by interviews with the consultants who responded to the RFQ, and feedback from a group of nine independent evaluators whose expertise span asphalt production and placement, quality management systems, environmental management and compliance, specifications development, and asphalt materials testing.

The council's vision for the OAPC Program is aimed at ensuring continuity in quality asphalt production and encouraging environmental stewardship in Ontario, with particular emphasis on:

- 1) A third-party inspection of asphalt facilities in Ontario;
- 2) The council's dedication to assisting plant operators maintain and operate their asphalt plants in a manner that minimizes environmental impact through the OAPC Environmental Practices Guide (EPG); and
- 3) Ensuring quality and durability outcomes that continue to meet stakeholder and OPSS specifications.

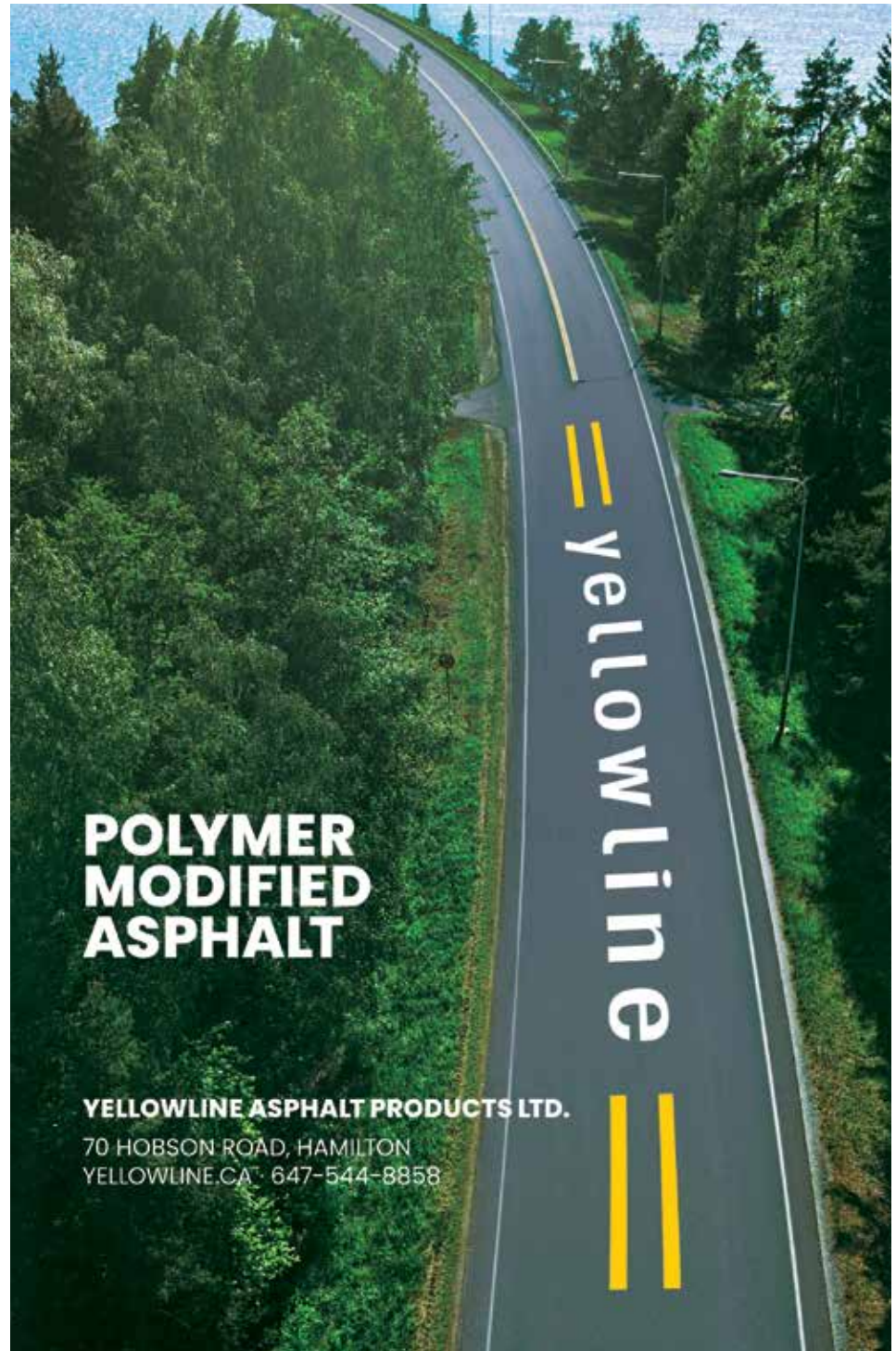
The consultant is expected to work within the above-mentioned guidelines and in consultation with the OAPC Plant and Paving Operations Committee to develop a framework detailing:

- An application checklist that must address key inspection points, production data collection/review/records, environment, health/safety, use of RAP, etc.;
- Application guidelines and timelines to include rules for compliance and/or non-compliance;
- Guidelines for roles and the responsibilities of ORBA/OAPC and the third-party plant auditor(s), including training management requirements for quality auditing and inspection as it impacts on the successful implementation of an asphalt plant certification program;
- Guidelines for eligibility considerations for the certification program, and a pricing structure for applicants; and
- Recommendations for mandating relevant requirements to the Ontario Provincial Standard Specifications as part of the requirements of the plant certification and stipulate the limitations of the plant certification program.

The OAPC Program framework is anticipated for completion at the end of March 2025. However, a preliminary

draft will be available for presentation to the membership at the ORBA/OAPC Convention and Annual General Meeting (AGM) in February 2025. There is a need to rebuild client-relationship trust and confidence towards better quality asphalt in Ontario. The OAPC Program could be a tool in the box to achieve this objective.

A timeline for implementing a transition towards asphalt plant certification will be determined following the framework development and acceptance by the membership. ORBA/OAPC remains committed to continuing engagement with all stakeholders, especially the municipal partners for their buy-in into the OAPC Program. ■



INDUSTRY NEWS



2024 FALL ASPHALT SEMINAR **NOVEMBER 28 - 2024**

PATHWAYS TO A **SUSTAINABLE FUTURE** FOR ASPHALT TECHNOLOGY

OAPC FALL ASPHALT SEMINAR – NOVEMBER 28, 2024

The seasons are changing, and so is the world of asphalt! We're excited to invite you to OAPC's Fall Asphalt Seminar, *Pathways to a Sustainable Future for Asphalt Technology*, an event that promises to redefine the future of our industry. Dive deep into meaningful conversations with industry professionals, thought leaders, and decision-makers; equip yourself with the latest trends, technologies, and best practices; and celebrate our vibrant asphalt community with us.

Join us on November 28 by emailing Jasvinder Singh at Jasvinder.singh@orba.ca.

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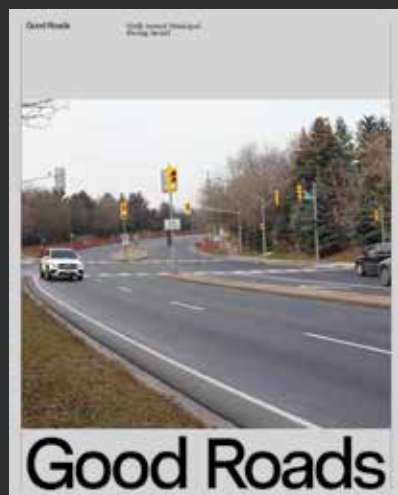
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EIGHTH ANNUAL MUNICIPAL PAVING AWARD

DEADLINE DECEMBER 27, 2024

The Municipal Pavement Awards recognize successful municipal-private sector collaborations in hot mix asphalt road construction in Ontario. All hot mix paving projects completed between January 1, 2024 and November 30, 2024 are eligible. To nominate a project, complete [the application form](#) and provide supporting documentation no later than December 27, 2024.



2024 ANNUAL MEMBERS' GOLF TOURNAMENT

The sold-out annual members' golf tournament on August 29 featured over 400 golfers on three courses. Thank you to our participants and especially our sponsors for making this such a successful day.

2024 OAPC ASPHALT TECHNICAL SYMPOSIUM

We thank everyone who made this year's OAPC Asphalt Technical Symposium a success. The event, which took place at the Scarborough Convention Centre on June 11, allowed for a great presentation venue followed by a guided tour of McAsphalt's performance testing laboratory. A big thank you to our 2024 sponsors!



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ORBA/OAPC AT AMO

ORBA and OAPC hosted their second annual social event at the end of the first day of the Association of Municipalities of Ontario (AMO) conference on August 18 in Ottawa. Board and OAPC directors joined ORBA president Andrew Weltz and CEO Walid Abou-Hamde in welcoming Ontario ministers, mayors, provincial and municipal officials, industry partners and friends for an evening filled with good conversations and great ideas.



DR. SUSAN TIGHE APPOINTED PRESIDENT AND VICE-CHANCELLOR OF McMASTER

Dr. Susan Tighe has been appointed President and Vice-Chancellor of McMaster University effective July 1, 2025. Dr. Tighe is currently McMaster's Provost and Vice-President (Academic) and previously served as the Deputy Provost, Associate Vice-President, Integrated Planning and Budgeting at the University of Waterloo where she was a founding member of the Centre for Pavement and Transportation Technology (CPATT). We congratulate Dr. Tighe and wish her all the best in this exciting new endeavour.

SAVE THE DATE

Scan to see all
of our events!



OAPC CHAIR'S DINNER
NOVEMBER 27

OAPC FALL ASPHALT SEMINAR
NOVEMBER 28

ORBA CONVENTION
FEBRUARY 2 to 4, 2025

ORBA ROAD BUILDING ACADEMY
MARCH 3 to 7, 2025

ORBA/OAPC GOOD ROADS CONFERENCE
MARCH 30 to APRIL 2, 2025

OAPC SPRING OPERATIONS SEMINAR
APRIL 10, 2025



THE FINAL WORD

Bruce Armstrong

Respect

I don't bleed black, certainly not in the sense that the award was originally intended to recognize. I have no great passion for asphalt as a material. Sure, I like it, and I've had enough of it on my skin and clothes over the years. But I fell into this industry by accident. As Andre Parent told me when he offered to hire me after working for him in my last summer before finishing school, I was the first guy who was stupid enough to work at his dirty old plant, but smart enough not to screw up too badly.

What I have really valued during my 37 years in this gig is the cast of characters that I met throughout my journey (some more colorful than others) and the relationships that resulted. So, I'll concede that maybe I bleed black in the sense of having a passion for the industry, in particular the people that made it a great environment for a career. My wife and many of my best friends are people whom I met in the asphalt industry.

When I started phase two of my career in 2007 at Canadian Asphalt, I wanted to set up a new ad campaign. I was arrogant (or maybe boyishly naive and optimistic) enough to assume that everyone who mattered knew who we were; that we had the best quality, service, etc. My goal was to support OHMPA, remind people that we existed, set ourselves apart, message our core values, and have some fun in the process. The message of our first new ad was "It's all about relationships."

The key to good relationships is respect.

I'll never forget the first time I met Larry Tanenbaum. He came to see the emulsion plant that he'd just bought. I was walking across the yard wearing dirty old coveralls when his car pulled in. He got right out and came to me with his hand held out and introduced himself. I said, "Nice to meet you, Mr. Tanenbaum, but I won't shake your hand because mine is dirty." He grabbed my hand and said, "You call me Larry, and please show me around YOUR plant." Respect – leadership Rule #1. This trait was also demonstrated to me by people like Jim McLarty, Mark Rivett, Ray Legault and Jean Lussier.

Respect is vital to the success of industry groups like OAPC. You have to be respectful of your associates, competitors, and other stakeholders. When I announced my retirement, I got a note that read, in part, "I also appreciate the fact that right from the day I started...almost 20 years ago, you always made the time to say hello. May not seem like a big deal, but when you are younger, just starting out in this industry, it can be quite intimidating being at a function with owners, presidents, etc. Most don't have a clue who you are to do the same, or even care." This meant a ton to me because I remember those who gave a shy boy like me the time of day when I was one of those new guys hiding in the corner who didn't know many people.

The accomplishments that I'm most proud of in my career aren't profits, sales volumes, products that were developed, or plants that we built. They're relationships with people, which may seem to be a bizarre comment coming from an introvert. What is more rewarding to me is seeing people that I hired, mentored or worked closely with who have risen to tremendous success. Y'all know who you are, and I'm proud to have been associated with you.

Sorry for the cliché, but you get out what you put in. Be respectful of those around you, get involved in groups like OAPC, and treasure all the relationships that you're building. Rock on, and be excellent to each other! ■

Bruce Armstrong was Director of Sales for Canadian Asphalt Industries Inc. before retiring.



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