

ASPHALTtopics

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ONTARIO ASPHALT PAVEMENT COUNCIL

MUNICIPAL PAVING AWARD

Brennan project wins

401 WIDENING

massive project nears completion

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COVER PHOTO

401 expansion project from Credit River, Mississauga to RR25, Milton. (WCC)

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CHAIR'S CORNER

Dominic Crupi
Chair

Investing in our industry's future

I find myself as the sitting chair of the Ontario Asphalt Pavement Council after being involved in the industry through my family's business for over 27 years. I still feel as proud to be a part of it today as I was the first day I looked back at a beautiful smooth black paved road and saw what the results of an extraordinary effort of a dedicated team and quality product can produce.

The past several years have been difficult for every industry and demographic, and the circumstances around dealing with a global pandemic have created new and problematic challenges for the road building industry. In my opinion, it has never been easy to build a team of eager individuals who are keen to put in whatever work needs to be done to complete a goal and grow a workforce, but it has been possible with a great deal of effort. Now with the events of the last few years, it seems our industry especially struggles with finding these dedicated people for any role from head to toe of an organization.

One of the mandates in our strategic plan as a council is to improve and further develop our involvement in promoting our industry through scholarship programs as well as outreach to educational institutions. We hope this is where we can appeal to younger people within our communities to consider the idea of joining the road building industry and more specifically, the asphalt industry, as a rewarding and fulfilling career.

I take this mandate in particular very seriously as I think the more young people we can reach, regardless of where they come from and what their background or gender are, the

more we can improve our sustained growth and strength with youth driving us. We absolutely need the wisdom and experience of those well established within our industry, but without anyone to pass that on to, we will never be able to move forward in a positive direction.

Asphalt paving has always been seen as a hot and dirty job, because in a lot of ways it is. That does not mean, however, that it can't be presented to young people as a rewarding direction they can head toward. Most things in life that are worthwhile are difficult and this industry is no different.

Every single position you can possibly hold in our industry has changed drastically since I joined it. If you are working at an asphalt plant, the specifications related to the material we produce, as well as the technology involved to make it, have become more challenging and technical. The men and women involved in the paving of the material we produce are required to think more than ever about quality and the specifications of the finished product. Everything they do affects the end product. The team that administers the projects on the contractor's behalf needs to be knowledgeable and involved from bid stage to completion in order to protect the company's interests as well as ensure issues don't linger and create long-term problems.

As stewards of this industry, we all need to do our part to attract more young people to consider a well paying, fulfilling career option in road building and paving to sustain our growth and ensure asphalt remains the best choice for every municipality and owner looking to maintain and improve their infrastructure. ■



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OPERATIONS CORNER

Doubra C. Ambaiowei
Director, Technical Services

The future of quality asphalt in Ontario

ASPHALT... ONTARIO RIDES ON US! Asphalt is the pavement of choice for Ontario, and rightly so when the benefits of paving with asphalt are combined with societal trends and economic realities such as infrastructure development budgets, the emerging focus on sustainability, and the numerous opportunities within the asphalt industry.

OAPC's vision is **dedicated to promoting excellence in asphalt pavement product quality and paving techniques**. The pursuit of this objective is evident in our messaging from this year's Spring Operations Seminar, Partners-in-Quality Road Tour, our continuing educational publications and informational brochures, and collaborations with other industry partners and forums. Highlights from some of these industry events and other initiatives are captured in this summer issue of *ASPHALT*Topics.

We continue to emphasize that stakeholder input at all levels of responsibility is highly valuable and necessary to build trust and ensure progress and improvement on a day-to-day basis. This is why the 2022 OAPC **Asphalt Technical Symposium (ATS)** on June 23 provided a very important platform for education on the specific elements of technology necessary to achieve high performing asphalt pavement, including materials, design and construction practices, unbiased technical discussions, sharing, and connectivity between leading asphalt technical experts.

Consultations with our provincial and municipal partners on topical issues remain on-going, with regular member updates being provided via various ORBA communication channels. Please look out for the ORBA **Quarterly Technical Highlights** bulletin released on June 30 that provides information and highlights from recent ORBA and OAPC technical advocacy initiatives.

We hope you will join us on November 30 as we capture the experiences, views and expectations for the future from past OHMPA presidents and council chairs in our first-ever **Chair's Dinner**; and on December 1 for the annual **Fall Asphalt Seminar**,

where our focus on innovations in asphalt technologies will be further discussed. Please stay tuned for the respective program details!

The future of asphalt in Ontario would be incomplete without a mention of the **Trillium Award Program** managed and administered by the OAPC Plant and Paving Committee. Applications for 2022 are due on October 28 and eligible facilities are encouraged to apply. An update to the OAPC 2015 Environmental Practice Guide is also underway spearheaded by the OAPC Environment Subcommittee.

This summer issue of *ASPHALT*Topics outlines several interesting features and articles that blend very well with our quality objectives and the future of asphalt – ranging from other jurisdictional technical briefs and research studies, to an overview on future climate projections and related tools, and understanding the performance characteristics of Reclaimed Asphalt Pavement (RAP).

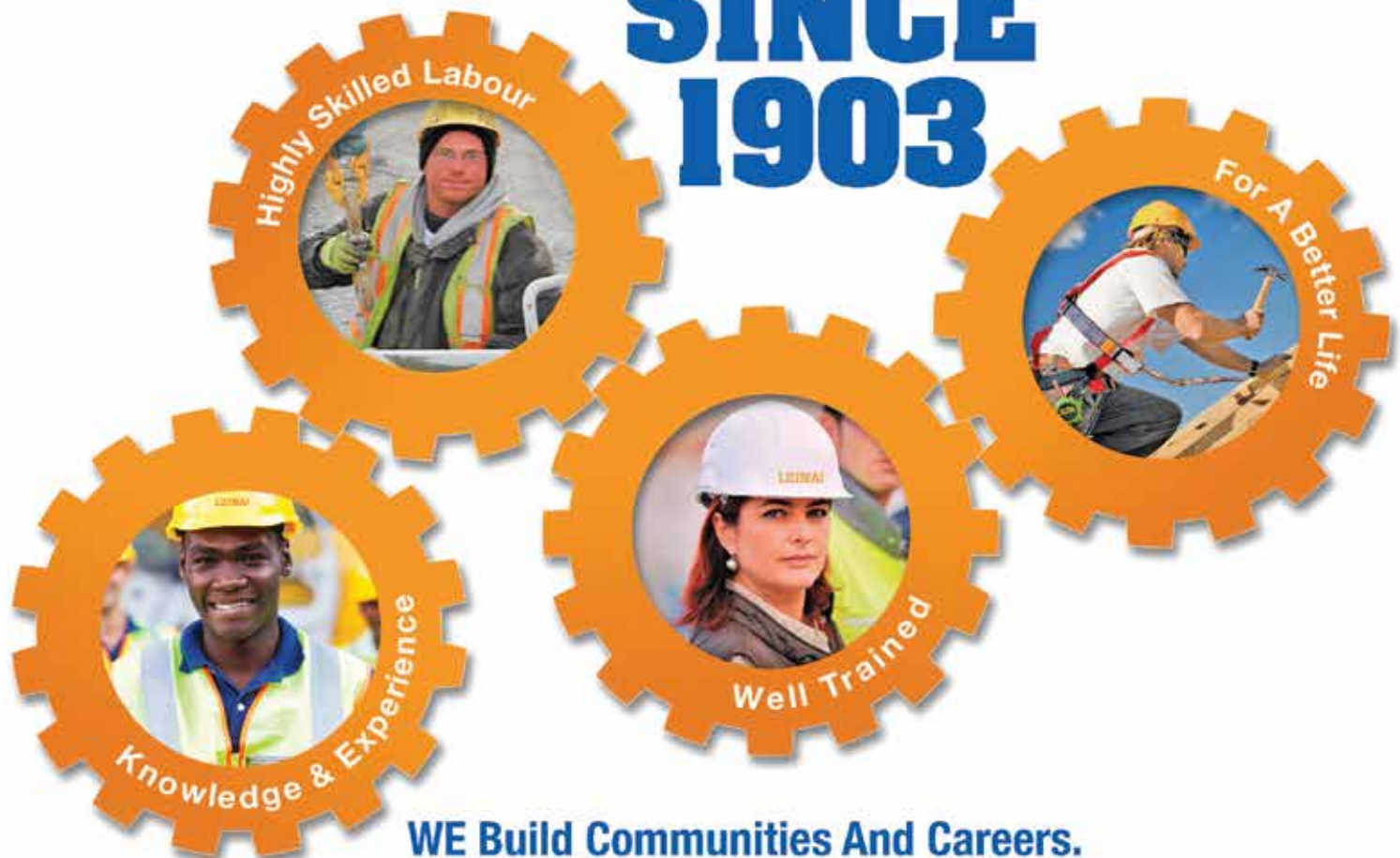
Speaking of RAP – yes, an **Ontario RAP Report is underway!** This initiative, championed by Good Roads, the Municipal Engineers Association (MEA), OAPC, and the Centre for Pavement and Transportation Technology (CPATT) at the University of Waterloo, has objectives to report vital metrics on RAP stockpiling in Ontario, present an Ontario municipal state-of-the-practice on RAP, synthesise information on best practices for RAP processing and stockpile management, and identify the most relevant documents for our specific jurisdictional benefits.

The future of quality asphalt in Ontario remains a collective effort, and you are encouraged to be a part of our success.

We welcome new and continuing volunteers on specification consultation reviews, information exchange about best practices, professional development, networking, and mentoring opportunities. Together, and by employing dedication and professionalism, we can keep asphalt as the pavement of choice for Ontario.

As always, I look forward to hearing from you pertaining to all things asphalt. Please stay safe and enjoy the summer! ■

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MARCOM MATTERS

John Provenzano

Director, Marketing & Communications

Earned media explained

In April, I was able to finally meet many of our members for the first time at the Partners-in-Quality Road Tour. I was excited when I heard that I would have an opportunity to give an overview on what was going on in marketing and communications. Along with the usual updates on the development of our new website, events and publications, I gave an update on earned media. That's when I looked out into the audience and saw a glazed look in everyone's eyes. I'm sure people were thinking, "What in the world is earned media?" I gave everyone present a short tutorial on the subject and I thought it would be a good idea to include it in my column as well.

In my last MarCom Matters column, I explained how we now have a monthly opinion column in 30 Metroland community online newspapers that have an earned media reach of over 10 million readers. Some of the larger online media outlets that publish our column include TheStar.com, Toronto.com and Mississauga.com. This means that the 30 publications combined have 10 million readers visiting the site every month with our column being one of the columns they might read.

Earned media, or earned content, is any material written about our association or council that we haven't paid for. In many ways, earned media is publicity. Sometimes we send out a media release about a certain topic or policy position. For the 2022 provincial elections, we disseminated a media release stating our organization's priorities. Media outlets either used the release as is in their publication or they

reached out to us to schedule an interview that they published as an article. We didn't pay for this media to be created, the way you would for, say, an advertisement, and therefore our actions alone "earned" us this attention.

Earned media is very effective. Today's consumers are influenced greatly by family, friends, and what they read and see online. People no longer share the good, the bad, and the ugly of brands exclusively at the water cooler; they share it with everyone they're connected with online, which can include hundreds, thousands, or maybe even millions of people.

MarCom will continue to use newspapers, both in print and online, to share both what we do best and also any policy initiatives that impact people both municipally and provincially. Just like a story on TV about a new business development, local newspapers can just as easily pick up this story and publish it for online readers.

LinkedIn and Twitter also revolve around trending topics locally and provincially, but there are also countless smaller communities of LinkedIn and Twitter users who broadcast their thoughts on issues related to our industry. A tweet or post, therefore, is a tiny instance of earned media.

As digital marketing and social media continue to evolve, so will earned media, and departments other than public relations, like marketing, will become more responsible for capturing earned media attention. ■



*Paving excellence
recognised by*

Municipal Paving Awards

by **James Careless**

Year two of the COVID-19 pandemic failed to dampen the determination and resilience of Ontario's asphalt producers, pavers, and government partners in delivering the best roads for the province. Some of the best were celebrated during the fifth annual Municipal Paving Project of the Year award presented at the Good Roads conference on April 12, 2022. »

The Kennedy Rd./16th Ave. project used 50,368 tonnes of WMA.

T

he winner for 2021 was Brennan Paving & Construction Ltd. for their rebuilding of Kennedy Road/16th Avenue in York Region. The finalists were Associated Paving & Materials Ltd. for the widening of Haldimand Road 20, and Sierra Infrastructure for the doubling of Rest Acres Road in Brant.

The Municipal Paving Project of the Year Award recognises and promotes successful collaborations between asphalt producers, pavers, and municipalities for excellence and innovation in Ontario paving projects. All entrants to the competition are assessed on the finished pavement's conformance to the project's specifications, visual appearance, overall quality, innovations, and considerations such as tight schedules and dealing with traffic flows, among others.

Brennan Paving & Construction's Rebuild of Kennedy Road/16th Avenue

Resurfacing a busy road is a major challenge for any paving company. But for Brennan Paving & Construction Ltd. (a division of The Miller Group), redoing two sections of York Region's Kennedy Road and 16th Avenue was a major exercise in preplanning and safety management. Under a \$7,574,485 contract, the company removed and replaced over 38.7 lane kilometres of four lane urban arterial roads in a heavy traffic zone that included many vulnerable areas.

"It was a very, very high profile job, especially on the Kennedy Road portion," says Chris Hankey, Estimator/Project Manager with Brennan Paving & Construction. "We were right around a number of schools where we had children crossing Kennedy Road

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Using WMA allowed us to cope with traffic delays while enjoying longer compaction times.

CHRIS HANKEY

Brennan



through our construction zone in the morning and the afternoon. So throughout the job, we were constantly readjusting our traffic control plans and adding more paid duty police to ensure that the children and general public were able to cross the road in a safe manner, while still hitting our production targets consistently."

"The team was tasked with maintaining the flow of high traffic volumes on the two roads and the safety for all users within the same space as the construction zone," says Colin Wong, York Region Project Manager. "As the opportunity to close traffic lanes was limited throughout the day, the team made use of extended working hours and weekends."

The specific contract with York Region took 105 days to complete in 2021, covered 3.1 km of four lane roadway with turning lanes on Kennedy Road from Markham's Main Street to 16th Avenue, and 4.1 km of similar roadway on Kennedy Road from Highway 7 North to 16th Avenue.

The project used 50,368 tonnes of warm mix asphalt (WMA), and consisted of partial depth removal of the existing asphalt followed by the application of WMA asphalt pavement. The contract also included upgrades/improvements to five intersections along 16th Avenue and four along Kennedy Road to meet Accessibility for Ontarians with Disabilities Act (AODA) requirements, including push buttons, upgraded walkways, curb depressions and tactile (raised) walking surfaces. Four hundred and sixty-nine metres of new guide rail end treatments were also installed. The quantity of WMA used was 13,578 tonnes of SP 12.5 FC2 Cat D, 22,877 tonnes of SP 19.0 Cat D, and 13,913 tonnes of SP 25.0 Cat D.

"Basically the project was a resurfacing project on both sides where we were taking the asphalt right down to granular, coming up a few lifts of SP 19 or SP 25 – depending on where it was in the project – and finishing off with SP 12.5 FC2," says Hankey. "As well, there were some concrete curbs and gutters that were redone, a bunch of catch basins, some guardrail, and some sod. And there was also an electrical

component where we were changing out lights, pedestrian poles, and getting everything up to AODA standards."

It was York Region who called for the use of WMA in this project. Back in 2020 the region decided to primarily use WMA in its projects due to its environmental advantages including reduced greenhouse gas emissions and energy/resource use in production, improved working conditions and handling at lower temperatures, faster re-opening of traffic lanes after paving, and reduced thermal ageing of the asphalt.

For his part, Chris Hankey liked working with WMA on the Kennedy Road project. "We were seeing asphalt shipment times from plant to the roadway of well over an hour to an hour and a half due to the traffic in the area," he explains. "Using WMA allowed us to cope with those delays while enjoying longer compaction times than HMA could offer in this situation, which was a huge, huge plus for us."

Overall, the Kennedy Road project was a success not only because of the quality of the paving, but also due to Brennan's willingness to work with York Region to incorporate measures to address speeding and unsafe driving on Kennedy Road, including reducing lane widths, installing school zone pavement markings, and upgrading a guide rail system. "The open dialogue between the neighbourhood representatives, the contractor and York Region is what made the project successful," says Abdus Sobahan, York Region's Construction Administrator. "The team was committed to listening to the concerns of all residents, was flexible in delivering the project, and took action to accommodate all users."

Brennan's winning the 2021 Municipal Paving Project of the Year award for the Kennedy Road project "is a great honour," Hankey concludes. "It's really nice to be recognised for the long hours that our crews put into it, and to see that they're being recognised along with us for putting the public first, putting quality first, and ensuring that a good job was done by all." »



The project's three multi-lane roundabouts were a first for Brant County.

Sierra Infrastructure Doubles Rest Acres Road

Woodstock's Sierra Infrastructure and its paving contractor Steed & Evans worked with the County of Brant to expand Rest Acres Road (Highway 24) from a two lane rural highway to a four lane arterial road over 2020 and 2021. The project had been scheduled for one year, but was delayed due to the discovery of a bird nesting ground.

The expanded section of Rest Acres Road runs from King Edward Street to Highway 403. Three multi-lane roundabouts were added to major intersections, and multi-use trails were installed on both sides of the highway. The project also involved roadside and roundabout landscaping, a new stormwater management facility, modifications to water distribution infrastructure, a new storm drainage system including a segregated exfiltration trench, a new water main, plus various utility structure adjustments, street lighting, traffic signals, AODA enhancements and associated restorations.

"This project was a much needed upgrade to Rest Acres Road/Highway 24 due to growing capacity requirements as this highway is adjacent to several new business and residential developments as well as close proximity to the 403," says Corey McPherson, Project Manager of Sierra Infrastructure Inc. "The majority of the road construction, including new roundabout construction, took place while maintaining through traffic by use of significant traffic control measures while limiting full closures for surface asphalt over the course of five nights."



Recycling and reusing the existing road granular material had environmental and economic benefits.

The application of superpave mixes made this project unique in the county.

JOE MURPHY

County of Brant

4,835 tonnes of HMA were used to expand Rest Acre Roads. Three different asphalt mixes were utilised to complete this project, namely Superpave 19 binder course (which was completed in two lifts), Superpave 12.5 Category "D" surface course for the tangent sections, and Superpave 12.5 FC2 Category "D" surface course for the roundabouts and approaches. All courses of asphalt were completed using a material transfer vehicle.

"The application of superpave mixes made this project unique in the county," says Joe Murphy, Capital Project Manager with the County of Brant. "This is also the county's first roundabout corridor."

"Another unique aspect of this project is that through several sampling and testing methods, it was determined that the existing road granular material was able to be recycled and reused on this project," McPherson says. "This had environmental and economic benefits to both Sierra and the County of Brant."

Despite the challenges of expanding a heavily travelled highway, the Rest Acres Road expansion came in under budget, while achieving the county's goals. "The project was a success and we have a beautiful, well-functioning roadway corridor," says Murphy. "It shows that even small, predominantly rural municipalities can build roads just as well as large municipalities." »

APM's Widening of Haldimand Road 20

It took Burlington's Associated Paving & Materials (APM) just 60 days to widen and resurface Haldimand Road 20 between Kohler Road and Townline Road in 2021. The \$3,088,429.22 contract saw APM and subcontractor Roto Mill Services use Cold-In-Place Recycling with Expanded Asphalt Mix (CIREAM) – a green paving process – to widen 14 kilometres of roadway.

In addition to widening this road from 7.0 m to 8.0 m in the project zone, Haldimand County wanted to "address the transverse cracking that was prevalent in the asphalt," says Lloyd Rollinson, Project Manager of Municipal Infrastructure with Haldimand County Engineering. "To resolve these issues, CIREAM (OPSS MUNI 335) was chosen as the most economical solution that could both address the cracking in the existing road and allow for the incorporation of 0.5 m of the existing granular shoulders to be pulverised and blended into the mix to allow for the road widening. The CIREAM was overlaid with 60 mm of HL3 asphalt."

The decision to pulverise the existing roadway, then add approximately 16,000 tonnes of HL3 Surface Course Paving, and approximately 10,000 tonnes of Granular Roadway Shouldering, proved to be a cost-effective solution for Haldimand County. Despite the fact that 14 kilometres of roadway was affected by the project, there was minimal impact to residential and commercial traffic, with roadway access and all turning movements being maintained throughout.

"Cold-In-Place paving is an incredible process that is used throughout the province to successfully repair and revitalise roadways," says APM General



The Haldimand Road 20 project used Cold-in-Place Recycling with Expanded Asphalt Mix to widen 14 km of roadway.

Pulverizing the existing roadway then adding approximately 16,000 tonnes of HL3 Surface Course Paving and 10,000 tonnes of Granular Roadway Shouldering was a cost-effective solution for the county.

Manager Marco Capobianco. "In this particular project, the county utilised existing shoulder granular [materials] with the Cold-In-Place process. APM added the required amount of corrective asphalt cement to strengthen the product and placed it on the roadway, while simultaneously correcting existing cross-fall grade issues. All existing material onsite was utilised and incorporated fully into building a lasting infrastructure."

During the asphalt recycling process, APM was able to improve this roadway's crossfall and drainage in problem areas, such as the super-elevated bend at Bains Road. Transverse cold joints were minimised thanks to APM producing about 1,900 tonnes of HL3 daily for the job. The crown joint was also matched daily, which eliminated the need for a longitudinal cold joint.

To improve rideability, which can be an issue on long rural roads, "APM organised a steady flow of inbound asphalt product combined with use of a asphalt material transfer vehicle to minimise the asphalt spreader from stopping while placing asphalt," Capobianco says. "Incorporating a slow and consistent paving process improved rideability."

At the end of 60 days, the Haldimand Road 20 widening was done. "Haldimand County was satisfied with the product and workmanship and that the objectives of the project were met," says Rollinson. "The project being delivered on time and on budget made it that much better!" ■

James Careless is an Ottawa-based freelance writer with credits in the National Post, Toronto Star, and AI's Asphalt magazine.

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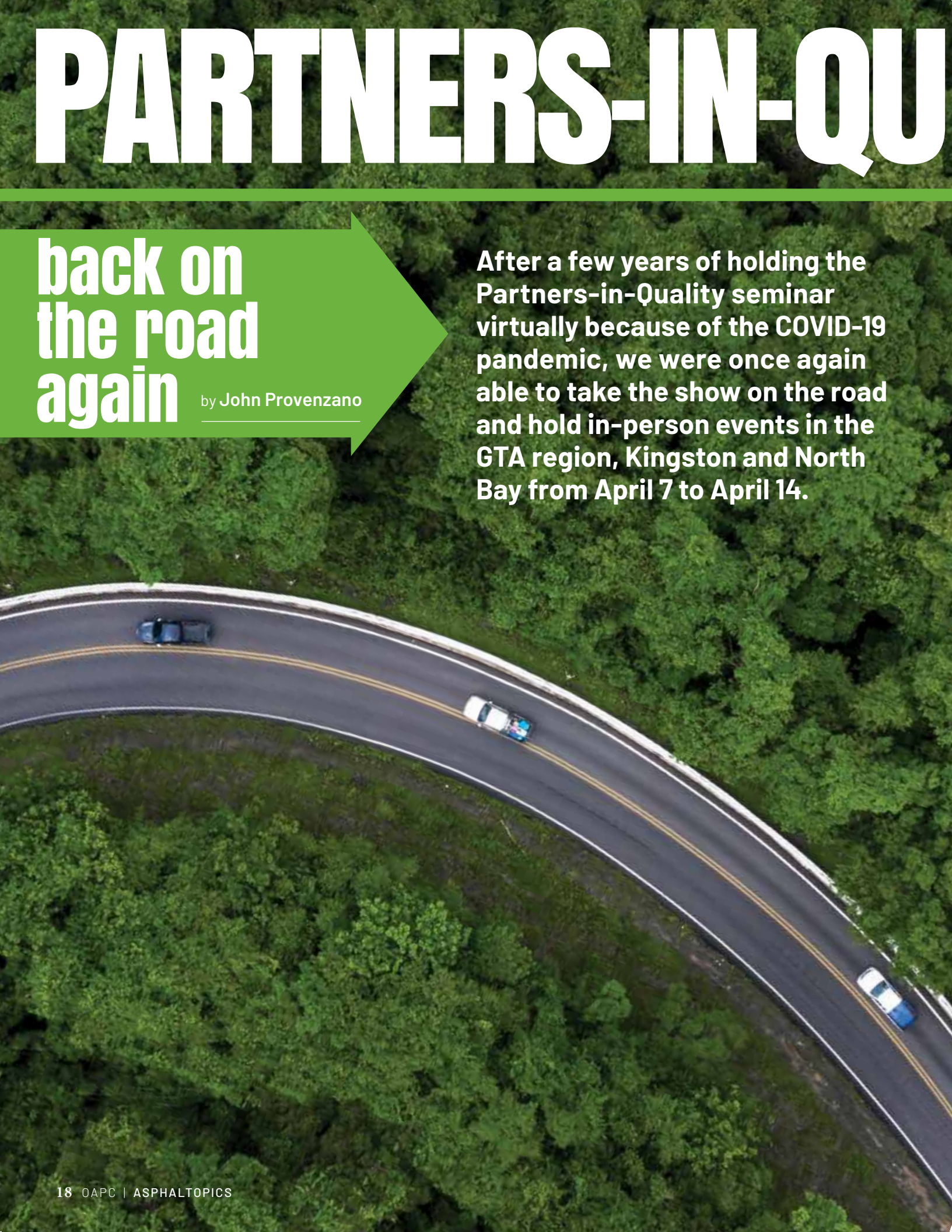
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PARTNERS-IN-QU



back on the road again

by John Provenzano

After a few years of holding the Partners-in-Quality seminar virtually because of the COVID-19 pandemic, we were once again able to take the show on the road and hold in-person events in the GTA region, Kingston and North Bay from April 7 to April 14.

QUALITY ROAD TOUR

This annual event is key to bringing together road owners and the industry to discuss the construction of quality roads while building a solid partnership. This year's Partners-in-Quality seminars presented a unique opportunity for producer members and contractor representatives to get the latest industry information that will impact their work in 2022. Attendees had the opportunity to meet face-to-face with local Ministry of Transportation representatives along with municipal and consulting engineers. The Partners-in-Quality seminars brought together the best minds in the industry to engage in conversation about what we have accomplished and how we can work toward achieving the highest quality asphalt.

OAPC Chair Dominic Crupi attended his first in-person event at the Kingston stop of the tour as the event MC. Crupi addressed those present and made it clear how important our industry is to the province's economy, generating approximately 37-billion-dollar in investment value. He mentioned how the industry employs approximately 56,000 workers during peak construction season, resulting in an estimated \$8.1 billion in total employment income.

Crupi spoke highly about how OAPC supports and enhances our craft and trade through education, partnerships, collaborations, and advocacy as well as research and developmental initiatives. Educational forums such as our annual Fall Asphalt Seminar, Spring Operations Seminar, and Partners-in-Quality Road Tour seminars provide and enhance knowledge, expertise and competence in our members' capability to provide quality asphalt pavements in Ontario.

The chair reiterated OAPC's commitment to best practices in asphalt production and placement, and how members can educate themselves on how we are promoting excellence in product quality and paving techniques, environmental best practices, the latest in the BaP Technical Standard, and the Trillium Award Program, by attending these types of seminars, by visiting the OAPC website, or by reaching out to OAPC's Technical Division.

The seminar in each city kicked-off with Phil Blankenship, president and owner of Blankenship Asphalt Tech and Training, with his presentation on **Performing Asphalt Mixtures: Quality Testing and Balanced Mix Design**.

At the GTA event, Gelu Vasiliu, head of the Bituminous Section at the Ministry of Transportation Ontario, presented on **MTO Bituminous Specification Updates & Other Initiatives (EMO)**.

Warren Lee, Senior Bituminous Engineer, and Heather Bell, Senior Bituminous Engineer, Bituminous Section at MTO, delivered the presentation in Kingston and North Bay respectively.

Christina Wright, Senior Environmental Scientist at BCX Environmental Consulting, appeared via video and took



questions virtually as she informed the group on the **Asphalt Mix Industry Standard (AMIS) Template Documentation – An Overview for Asphalt Plants**.

Amin Mneina, Coordinator for Technical Programs and Research at OGRA and MEA, informed members on the **OAPC/OGRA Liaison Report and the 2022 Local Municipal Forecast (OGRA/MEA)**.

Prabir Das, Project Manager, Major Projects Transportation Services with the City of Toronto, provided an update on the **City of Toronto's Asphalt Paving Programs and Performance Updates**.

Ryan Smith, Policy Analyst with the Canadian Centre for Climate Services, Stacey O'Sullivan, Content Development & User Engagement Assistant at the Pacific Climate Impacts Consortium and her colleague Kari Tyler, User Engagement Specialist, presented the group a sobering presentation on **Climate Change Impact on Transportation Infrastructure: Overview of ClimateData.ca**.

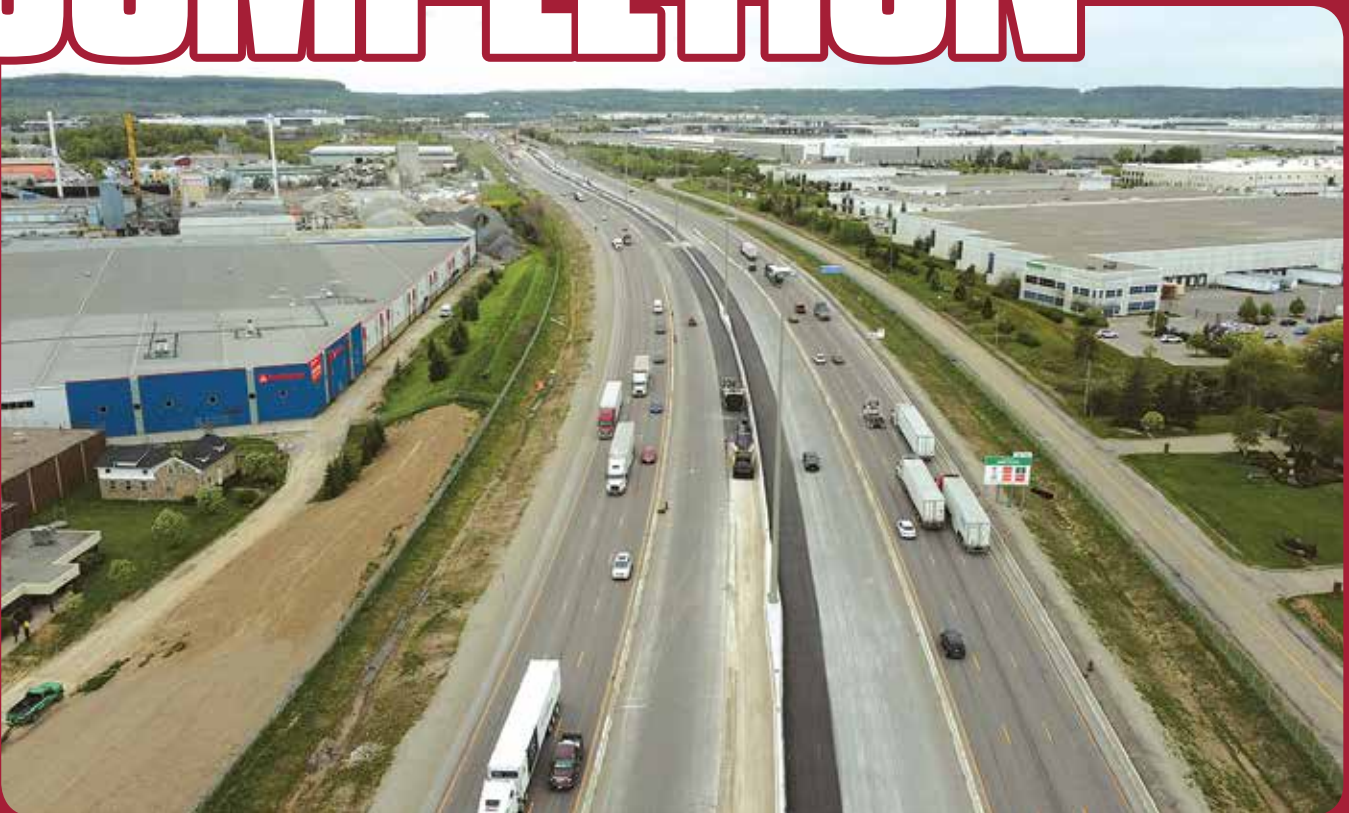
Dr. Pejooan Tavassoti, assistant professor in the Department of Civil and Environmental Engineering at the University of Waterloo, gave insights on **Integrated Pavement Solutions: Advancing Resilient Strategies**.

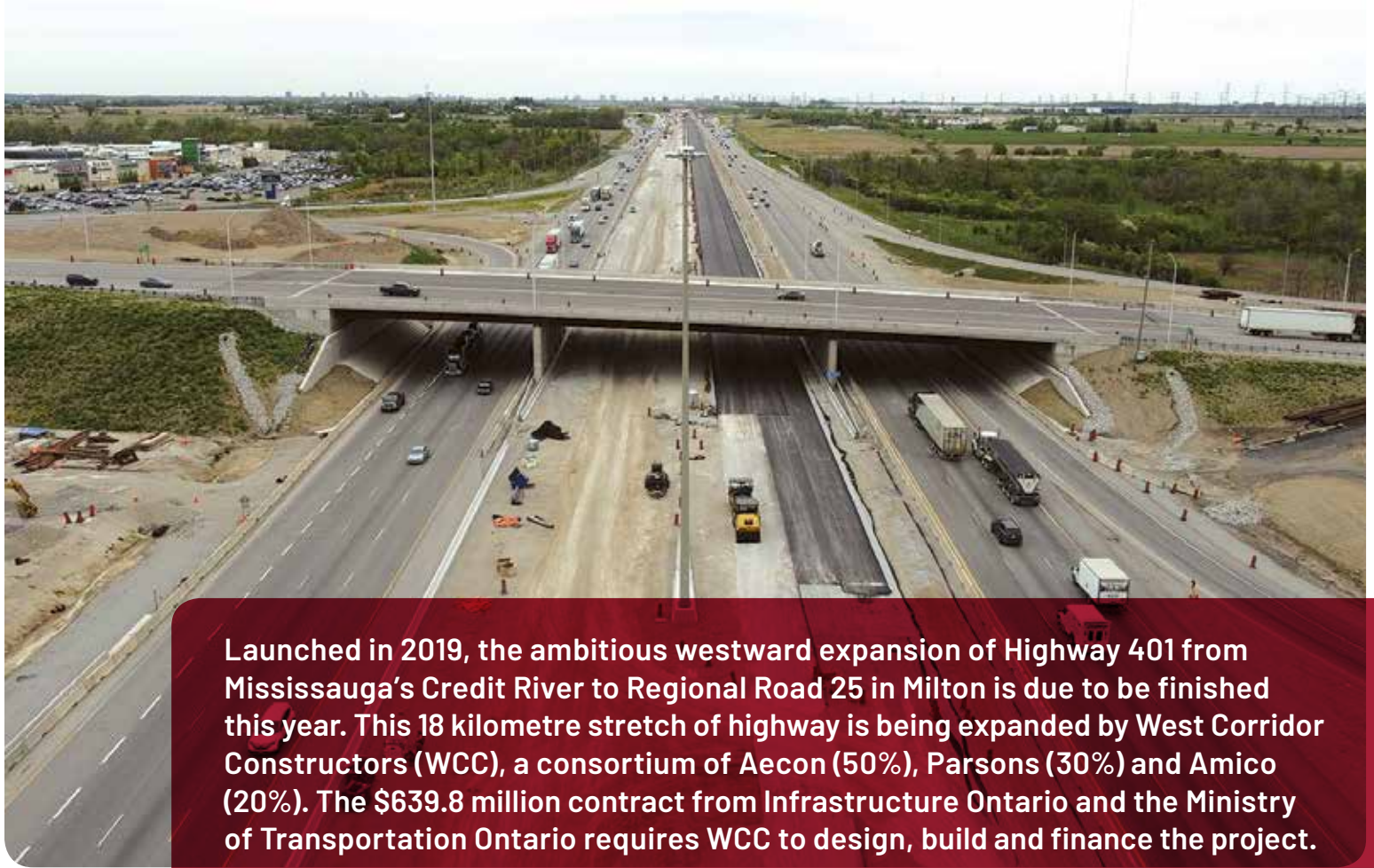
The day concluded with ORBA's Director of Technical Services Division, Doubra Ambaiowei, and his presentation on **Improving Municipal Connections: An OAPC Approach**, followed by an update on ORBA's latest Marketing and Communications initiatives.

For those who were unable to attend the Partners-in-Quality Road Tour, or for those who want to read or view the presentations again, please visit www.onasphalt.org ■

MASSIVE 40+ WIDENING PROJECT NEARS COMPLETION

by James Careless





Launched in 2019, the ambitious westward expansion of Highway 401 from Mississauga's Credit River to Regional Road 25 in Milton is due to be finished this year. This 18 kilometre stretch of highway is being expanded by West Corridor Constructors (WCC), a consortium of Aecon (50%), Parsons (30%) and Amico (20%). The \$639.8 million contract from Infrastructure Ontario and the Ministry of Transportation Ontario requires WCC to design, build and finance the project.

The scope of this project is awe-inspiring. To improve traffic flow west of the GTA, WCC has to expand the current six lane 401 to support a 12 lane core-collector system from the Credit River to Winston Churchill Boulevard, and 10 lanes from Winston Churchill Boulevard to Highway 407 ETR/Highway 401 interchange. The consortium also has to build a 12 lane core-collector system from Highway 407 ETR/Highway 401 interchange to east of the James Snow Parkway, and 10 lanes from the James Snow Parkway to west of Regional Road 25. The project includes the construction of median HOV (high occupancy vehicle) lanes plus support facilities and features such as drainage, lighting, signage, Advanced Technology Highway Management (ATMS) equipment, and carpool lots.

To add to the challenge, WCC has been doing this work while keeping the 401 open to traffic. Doing so has required a mix of temporary bypass lanes, shifting traffic barriers, and creative scheduling by the consortium's workforce, including lots of night work.

"I've worked on a number of phases of the 407 throughout my career," says Aecon General Superintendent Mark Taylor. "Still, this has been one of the more complex and largest projects I have ever worked on."

A JOB OF MASSIVE PROPORTIONS



The 401 widening project is a massively large undertaking, and so are the quantities of materials, machines, and people required to make it happen. Due to the sheer scale of this project, WCC is sourcing its materials from multiple vendors in the GTA.

"We've done or are doing 1.8 million cubic metres of earth excavation and using 3.6 million tonnes of gravel on this expansion," Taylor says. "Approximately 750,000 tonnes of it has been generated by recycling the existing road base and putting it into aggregates in the project, which has saved us time and money on materials and transport."

WCC has laid or is laying down 775,000 tonnes of asphalt and a million square metres of Open Graded Drainage Layer (OGDL) on the granular base. It has also installed or is installing 18 km of sewers, 220 km of subdrains, 60 km of barrier walls, two large twin concrete box culverts and 165 high-mast lighting pole bases.

Bridge-building is a major part of the 401 expansion project with nine new bridges as well as the rehabilitation of existing bridges in the project area. For new bridges, the construction process involves excavating the ground to drive supporting piles. "Once you have your piles in place, you pour concrete footings on top of that, then your columns, and then pier caps on top of the columns," says Aecon Senior Structure Superintendent Tony Thomss who is in charge of this part of the project. "Next, you install structural steel girders, and finish the bridge with precast concrete panels for the decks and the walls. You then waterproof the bridge and turn it over to the asphalt crews for paving."

Because the 401 is an extremely high traffic area requiring pavements that last for years, WCC is putting down a thick, durable multi-layer pavement. "We're using SP 25 HMA in a 100 millimetre lift, followed by SP 19 in a 70 mm lift, and SP »



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The expansion involves 1.8 million m³ of earth excavation and 3.6 millions tonnes of gravel. Approximately 750,000 tonnes of existing road base was recycled.

19 in a 50 mm lift,” says Aecon Paving Superintendent Jeramus Wakefield.

“All of this is sitting on 700 millimetres of granular capped with 100 millimetres of OGD, and topped with a 40 mm running surface of 40 millimetres of SMA 12.5,” adds Harrie Van Dyk, Amico’s Construction Manager. “And yes, it’s pretty durable. Traditionally, you see concrete with OGD underneath, but in this case our contract required us to put OGD under the asphalt. Obviously, our clients want to make sure that this roadway lasts.”

Regarding the pavers, all of which are staged on site, Wakefield adds, “I have a 10 foot Roadtec, an eight foot Roadtec, two Caterpillar TL1055Fs and two Caterpillar AP655 pavers. One of the 1055s has an extra wide 30’ screed.”

THE CHALLENGE OF KEEPING THE HIGHWAY OPEN



Without a doubt, WCC’s biggest challenge in completing the 401 expansion (COVID-imposed problems notwithstanding) is doing the job while keeping this vital highway open. “There are about 500,000 vehicles a day that pass through here,” »



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says Van Dyk. "That's a lot of people getting to see what we're doing on a daily basis."

To keep traffic moving, three lanes of existing traffic had to be squeezed into two lanes towards the centre of the road to create room to lay down the new lanes. Next, the traffic was pushed to the new outer lanes, so that the inner lanes could be rebuilt.

"Because we moved the lanes around in order to accommodate traffic, the ramps had to be diverted multiple times," Wakefield notes. "We'd have to build a temporary ramp or build the highway in such a way that it would accommodate the ramp being altered multiple times for each entry/exit point. Meanwhile, the levels between the old and new lanes have elevation differences of about 300 millimetres. So you can't just take down a barrier wall and let traffic through. You have to pad that up to that new elevation to create a smooth transition first."

In a perfect world, making this traffic diversion system work would be difficult enough. But when you're dealing with the 401 at rush hour, traffic accidents get added to the mix. "Some of them can get pretty dramatic," says Van Dyk. "No matter what's going on, our crews want to help people in such situations, and to make sure we're not putting anyone in harm's way."

Heavy 401 traffic also played havoc with the expansion project's onsite receipt of materials and equipment. "There are a lot of

Because we moved the lanes around in order to accommodate traffic, the ramps had to be diverted multiple times.

JERAMUS WAKEFIELD

Aecon

people using the highway for commuting to and from work, for deliveries and whatnot," says Van Dyk. "Throw in some variables like accidents and it doesn't take long to see two to ten kilometre long backups in each direction. When we do hear that there's been an accident in the vicinity of the project or within the project, we work with our operations teams to redirect our trucks to use adjacent roads or cease operations, because we don't want people waiting in traffic."

Tony Thomss's bridge-building crew faced the same problems. "It was complicated when you had to deal with concrete and supply deliveries because the plant is all the way over at Highway 25," he says. "If we were pouring at Credit River or Mavis, we had very little time for the concrete to get placed once it once it got there due to traffic backing up." Space restrictions also meant that some bridges had to be built in stages which took more time.

WORKING AT NIGHT HELPS



Due to the difficulties associated with 401 laneway management, "a lot of all the work we do is limited to nighttime just because of the traffic congestion," Taylor says. "For the entire period of construction, we've always had and will continue to have night activities," says Van Dyk. "We're always doing night work for paving and all forms of construction, electrical — basically all disciplines require some nighttime activities, even though the majority of our activities are done during the day."

Unfortunately, this tactic isn't a perfect solution. Under the contract's Project Agreement, WCC's crew can close up to two lanes and a ramp to do work between midnight and 5 a.m. However, it can take up to an hour to prepare the construction zone for nighttime work, and another hour to ready it for daytime traffic. "These time constraints make it very hard to get the amount of work done that's required at night," says Wakefield. "So we request extra time, or pave ramps partially and finish them the next night."

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There's another challenge associated with working on this project, and that's smoothness. Because the WCC crew can't shut down the highway for an extended time period to execute textbook-style paving, they have to do the best they can in the space and time that they have.

"There are a lot of areas in this project that you would typically pave parallel to traffic to maximize smoothness," Wakefield explains. "But due to the limited space we're working in within the traffic barriers, we can't pave parallel to traffic because the paver won't fit. So we have to pave them either perpendicular or at an angle to the actual lane in a very tight space. This approach leads to deviations like bumps and dips in the asphalt. Our operators do their very best to minimize them and achieve the best smoothness possible, but problems still occur because we can't pave in the most ideal manner."

STAGING ALSO HELPS



WCC's decision to stage as much equipment and materials on the work site as possible has helped to reduce delays and keep the 401 expansion on track. "Practically everything is staged on the work site, which makes a difference in doing our job efficiently," says Van Dyk. "As well, having traffic moving either in the centre lanes or the outside expansion lanes opens up a corridor where we can move equipment relatively freely up and down the zone with the exception of interchanges and

ramps. In those cases, we just do the best we can. In others we make things work better by moving equipment and material on adjacent streets, rather than directly on the 401."

GETTING THE JOB DONE



The difficulties associated with the 401 widening project are no surprise given the incredibly busy working environment, the tight spaces the crews have to work in, and the huge volume of materials needed to complete this job. "Normally, people are thinking of using a few hundred thousand tonnes of stone and asphalt on a project," Van Dyk observes. "With this one, you have to think about using a few million tonnes. It just changes your perspective on things."

This said, creative thinking has made the 401 widening go better than expected in some areas. Of the many smart solutions that the WCC has come up with, "the recycling of the existing road base is probably the biggest," says Taylor. "By recycling the road base, we ended up with 750,000 tonnes of material that didn't have to leave the job site or get brought back in."

Based on current projections, WCC is on track to complete the 401 widening by the end of 2022, within their contract deadline. Given all the delays experienced by the construction industry during the pandemic, this is a tremendous accomplishment, and one that the three WCC members – Aecon, Parsons, and Amico – can be rightly proud of. ■

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by **Lara Henry**



Mix variability and RAP best practices at Spring Operations Seminar

After two virtual events, the OAPC Spring Operations Seminar was back in-person at the Scarborough Convention Centre on March 24. The seminar kicked off with a panel session on managing variability in asphalt mixes and the effect of introducing RAP with a lead-in presentation by Doubra Ambaiowei, ORBA Technical Services Director.

The morning continued with labour, plant, IHSA and job market updates, and concluded after lunch with the plant safety awards and an overview of the Trillium Award Program.

Key highlights from the panel session:



■ What strategies are recommended to keep deleterious materials out of a RAP stockpile or an asphalt plant?

- It is critical to know the source of the RAP and the method of removal. Plant waste could have partially coated unaged material and returned loads will have unaged material. Material removed by milling or excavating in-service pavements may be contaminated (typically only the surface layer).
- The pavement may have been milled full depth or milled in stages to recover higher grade aggregate that may be present in surface (wearing course) lifts. Asphalt cement content and grade may also vary with depth in the pavement structure. If sequential milling was used, the millings are typically separated into distinct stockpiles for later use. The asphalt cement in millings from in-service pavements will be oxidized to various degrees depending on depth of milling. There will not be any oversized material, but there will likely be excess fine material caused by the milling process.
- Recovery of RAP by excavation of roadways, parking lots, driveways, etc. will be similar to full depth milling, but there may be contamination from underlying aggregate with the potential for oversize and uncoated particles.

- It is important to have a monitoring process in place to examine incoming loads for deleterious materials and to direct the material to the appropriate stockpile for later use. Properly constructing a stockpile in layers is also critical to consistency.
- Quality control sampling and testing of the material either when building a stockpile of milled material or crushing and fractionating RAP is critical in determining the gradation and asphalt cement content of the stockpile. Testing of the grade of asphalt cement in the RAP is critical in determining the appropriate grade of additional virgin asphalt cement to be added to the mix.

■ Does the new provincial Asphalt Mix Industry Standard (AMIS) have requirements to guard against environmental pollution from emissions, or does it directly or indirectly impact on mix improvements?

- The Asphalt Mix Industry Standard or AMIS is a **voluntary** air emissions compliance option for asphalt plants in Ontario. Asphalt plants may register for groups of contaminants that

are covered by AMIS and comply with Ministry of Environment emissions requirements by following the requirements in AMIS instead of meeting ECA requirements for those contaminants. While it is primarily an environmental standard, there may be potential benefits to the mix in that there is a maximum annual average temperature limit of 168°C plus the tolerance of the measuring device which adds another layer of preventing potential overheating of the mix in addition to the precautions that plants already take.

■ What impact do the AMIS requirements have on RAP processing?

- AMIS requirements depend on the group of contaminants that the plant registers for. AMIS was originally developed with the intent of assisting plants with meeting Benzo-a-Pyrene or BaP emissions requirements. The most pertinent AMIS requirement for RAP in the category for BaP, metals, and VOCs is the maximum annual average temperature limit of 168°C plus the tolerance of the measuring device.
- The limit closely mirrors the 170°C maximum mixing temperature specified by OPS Specifications. The AMIS limit is an annual average and allows for the production of mix at lower temperatures (perhaps in warmer summer conditions) to allow production at higher temperatures if required provided that OPS Specifications are not exceeded. Warm mix asphalt »

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can also come into play as a tool in order to facilitate meeting the AMIS mixing temperature limit.

- AMIS requirements for Suspended Particulate Matter (PM) and Respirable Silica may indirectly impact RAP production; however, it is unlikely that plants will choose to voluntarily register for this group of contaminants given some of the requirements which may impede production.

■ **Are there any industry statistics on the state-of-practice on strategies such as covering, sloping, and placement on paved surface for minimizing and controlling moisture in RAP stockpiles?**

- There is no specific industry specification but there are best practices that should be followed.
- Moisture in the RAP, or cold feeds in general, is removed in the plant with the use of heat. Wetter RAP will require a longer mixing time to allow for moisture removal by transfer of heat through convection, conduction and/or radiation. Reducing the moisture in the cold feed before the plant reduces the fuel burned and/or the mixing time required and thus saves costs.
- One rule of thumb from industry literature, and also what utility companies use to give rebates, is to slope the grade at 4% from the front to the back before building the stockpile to promote drainage to the back so that the loader picks up drier material for the plant.
- Moisture in the cold feeds could affect the final asphalt cement content of the mix unless it is accounted for by moisture sensors. Asphalt plants that are worn, have some air leaks, or are not run efficiently may also have issues with moisture control.

■ **How can we encourage more owners to implement a requirement for fine-graded mixes where and when it**

is best applicable? In mix design, a fine-graded mix regardless of nominal maximum aggregate size has a gradation that, when plotted on the 0.45 power gradation graph, falls mostly above the 0.45 power maximum density line (particularly in the mid-sized sieves).

- Performance testing on fine-graded asphalt mixes has proven that the mixes have reduced permeability and increased durability in the field provided that the lift thickness is appropriate for the nominal maximum aggregate size to allow for compaction.
- Fine-graded mixes may be more costly, but increasing the cost at production is less expensive than replacing the pavement prematurely. Municipalities should specify fine-graded mixes for all surface course paving and base course paving that are only a single lift. Multiple course base lifts may be an opportunity to utilize a coarse-graded mix.

■ **Many owner asphalt specifications are becoming significantly tighter on mix production tolerances, with many specifying the removal of borderline tolerances for the Job-Mix Formula (JMF) on asphalt cement content for instance. What considerations justify such approaches from owner-specifiers?**

- Some owners are tightening the tolerances beyond what is specified in OPSS 310 and removing borderline allowances in an attempt to achieve durability. This may result in unrealistic requirements that cannot be achieved on a consistent basis.
- The elimination of borderline allowances given in OPS specifications can mean the removal and replacement of mix which may perform very well throughout the life of the pavement. This places undue risk on the contractor, and from the owner's perspective, it may result in contractors bidding in allowance for the extra risk such that the owner is paying a premium for risk as opposed to improved quality.

- A properly designed mix, produced to the requirements of OPSS 310 which allows for a $\pm 0.3\%$ variation in asphalt cement content along with a 0.2% borderline allowance, can and does produce a good product.

■ **When testing and analyzing the asphalt cement content of asphalt mixes, what is an achievable variance in asphalt cement due to reasonable testing proficiency scale and equipment tolerances?**

- Mix sampling plays a significant role in testing variation. A sample that is segregated, say on the coarse side, could result in a measured asphalt cement content that is lower than what is actually in the pavement.
- Testing variation is also important. CCIL 2021 correlation results from participating labs in Ontario and Quebec

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on samples intended to be identical show that the standard variation among labs for the asphalt cement content on one of the samples was 0.137%. The d2S limit which estimates the reasonable variation that can be expected between laboratories based on two standard deviations works out to a testing variation of $\pm 0.38\%$. Some of the modified limits in place in municipalities are tighter than the measured testing variation between acceptable labs without considering variations in production and in sampling.

■ **Does introducing RAP into hot mix have an impact on this variance, and if so, by how much?**

- Good RAP management can minimize the impact on the variation in measured asphalt cement content in the mix.
- Good producers treat RAP stockpiles as valuable materials. Truck drivers delivering recyclable materials to the yard are instructed where to dump materials so that unwelcome construction debris does not contaminate the RAP pile. RAP piles are regularly inspected to ensure they are free of deleterious materials.
- RAP piles are tested for asphalt cement content and this information is used as a production input. Well managed RAP stockpiles can have consistent asphalt cement content throughout the pile. Fractionating RAP into coarse and fine fractions is gaining in popularity and provides increased consistency within each fraction. Coarse fractions contain a lower asphalt cement content while fine fractions have higher asphalt cement contents. Fractionation also reduces the potential for segregation of the RAP which can impact asphalt cement content.
- Introducing RAP into the mix means another material to manage during production and this does affect variation. With good RAP management practices, the impact is expected to be slight.

■ **Municipal owners may have concerns with testing variability. Is there a general requirement for the labs conducting quality assurance testing to participate in a yearly correlation program?**

- All labs certified by CCIL as Asphalt Labs participate in an annual correlation program as a condition for annual certification. In addition, all labs must have at least one current CCIL Asphalt Technician working in the lab as a condition of annual certification. Details of the program are available from CCIL.

■ **Is there a plan to have all municipalities use the same specifications?**

- The Municipal Hot Mix Liaison Committee, a joint effort of OAPC and Good Roads, is working on this issue. Having a common spec for use by all municipalities would lower costs and reduce variability for the producers. Making things simpler is a good thing and the producers have been asking for quite a while for municipalities to get there.

■ **What is OAPC doing to deal with the problem of municipalities and consultants not utilizing RAP in mixes?**

- OAPC funded a major research project to understand the quality of asphalt in Ontario. One of the outcomes of the study was guidance on how to achieve durable asphalt pavements. OAPC has published this framework as a series of fact sheets on the top 10 ways get durable HMA pavements including:
 - #1 Do your homework,
 - #2 Encourage mixes that have higher asphalt cement contents,
 - #3 Specify a finer gradation for your mix type,
 - #4 Don't overheat the mix,
 - #6 Ensure adequate pavement bond (i.e., tack coat),
 - #7 Provide proper pavement density (compaction),
 - #8 Ways to produce uniform and consistent mix,
 - #9 Use RAP responsibly, and
 - #10 Complete QA testing and inspection.
- Using the guidance in the top 10 list allows us to design and produce long lasting and durable pavements – with RAP. These are tools that we can use today.
- When we look out into the near and mid-term future, ORBA and OAPC have participated in research and collaboration on tools to quantify the effect of RAP in the mix. These include recovered asphalt cement testing and mix performance testing.

■ **Is someone keeping track of all the asphalt specifications municipalities are using?**

- MEA/Good Roads are working on putting this list together.

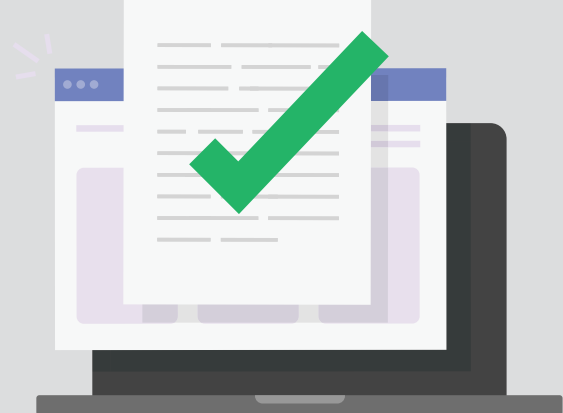
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Lara Henry is a communication specialist and editor of ASPHALTopics.

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FHWA TechBriefs make interesting reads

by **A.W. (Sandy) Brown**

TECHBRIEF

The Asphalt Pavement Technology Program is an integrated national effort to improve the long-term performance and cost-effectiveness of asphalt pavements. Managed by the Federal Highway Administration through partnerships with state highway agencies, industry, and academia, the program's primary goals are to reduce congestion, improve safety, and foster technology innovation. The program was established to develop and implement suggestions, methods, procedures, and other tools for asphalt pavement materials selection, mixture design, testing, construction, and quality control.

*US Department of Transportation.
Federal Highway Administration.*

The Federal Highway Authority (FHWA) in the U.S. publishes Technical Briefs (TechBriefs) on a regular basis. A TechBrief is a short document (usually 16 pages) that addresses issues related to pavements and materials that have been studied by lead states (select group of states that volunteer to conduct research) for a few years and are considered mature enough after study to present preliminary conclusions. Frequently, the study involves the publishing of one or more NCHRP reports (National Cooperative Highway Research Program). A TechBrief summarizes the reports and research and gives some general recommendations regarding the state of practice for other states to use in moving forward in adopting new technologies.

Two recent TechBriefs that may be of interest are outlined in this article.

RESPONSIBLE USE OF RECLAIMED ASPHALT PAVEMENT IN ASPHALT MIXTURES

As stated in the preamble of TechBrief FHWA-HIF-22-003 dated July 2021, "This Technical Brief summarizes techniques employed by State DOTs in the use of high doses of reclaimed asphalt pavement (RAP) in asphalt mixtures and communicates the benefits observed."

The document summarizes the research of the Florida DOT (Department of Transportation), Nebraska DOT, New Jersey DOT, South Carolina DOT, Washington DOT, and Wisconsin DOT. Each of the states has implemented the use of RAP to varying degrees and has placed some restrictions and requirements of its use in each particular agency's specifications.

The issues and approaches are local to the states existing practice and are summarised with a list of references at the end that gives details. In this case, the TechBrief also summarizes visits to each agency that were carried out by the research team.

The summary ends with the following two paragraphs:

This TechBrief summarized a wide range of techniques and criteria used by State DOTs to specify and design mixtures and pavements that incorporate RAP. Important considerations identified by the State DOTs and contractors for implementing the use of RAP were also summarized and included programmatic, mixture design, mixture production, mixture acceptance, RAP production, and QC considerations. Together, such considerations demonstrate that care should be taken during design, production, and construction to ensure desired performance. This TechBrief also revealed that there are opportunities for future improvements that can be accomplished through identified research needs.

All participating State DOTs indicated the desire to use mixture performance tests. Some State DOTs are using them in mixture design in a BMD approach, and some State DOTs indicated use for test strips and production or acceptance. Common themes were the need to get adequate virgin asphalt binder in mixtures, the need for appropriately setting performance test criteria and recognition of the benefit of long-term aging cracking test specimens. Another common theme was recognition that the resources that would be required to implement a BMD or use of performance tests on a regular basis are significant, and they may not be available in the short term. Finally, all of the State DOTs had strong partnerships with academia that they leveraged to evaluate performance and/or refine specifications and test methods directly related to the implementation of recycled mixtures.

DELTA TC BINDER SPECIFICATION PARAMETER

As stated in the preamble of TechBrief FHWA-HIF-21-042 dated September 2021, "This Technical Brief provides an overview of the binder parameter Delta Tc (ΔT_c). Delta Tc is an indicator of the effect of aging and additives on the asphalt rheology. More specifically, ΔT_c provides insight into the relaxation properties of an asphalt binder that can contribute to non-load related cracking or other age-related

embrittlement distresses in an asphalt pavement. This Technical Brief provides information for responsible deployment of the ΔT_c as a specification parameter should State DOTs be considering implementation.”

Unlike the previously discussed TechBrief, the document is not based on the research work of lead states but rather the research summarized by several NCHRP reports. A state-by-state review of the U.S. States Binder Specification (published by the Asphalt Institute (AI)) indicates that eleven state DOTs have already implemented ΔT_c . This TechBrief is considered to be a state-of-the-knowledge document intended to assist other states in their consideration of implementation.

From the introduction:

The difference in critical low temperature performance grade (PG) limiting temperatures, Delta T Critical, commonly referred to as Delta Tc (ΔT_c), is an asphalt binder parameter that provides insight into relaxation properties of the asphalt binder that can contribute to non-load related cracking or other age-related embrittlement distresses. Delta Tc is a calculated value using results (creep stiffness and creep rate) from the bending beam rheometer (BBR) test. It is intended to be used on asphalt binders that have been long-term aged (rolling thin-film oven (RTFO) plus pressure aging vessel (PAV)). However, ΔT_c can also be used on recovered asphalt binders from reclaimed asphalt pavement (RAP) and reclaimed asphalt shingles (RAS) or combinations of these with virgin asphalt binder.

The advantage of the parameter is that it can be determined by calculation from routine testing carried out as part of acceptance testing procedures and does not require additional testing. The parameter was discovered serendipitously during a research study of neat (unmodified) asphalt binders in place on aged asphalt runways (Airfield Asphalt Pavement Technology Program (AATP), Project 06-01, Techniques for Prevention and Remediation of Non-Load Distresses on Hot-Mix Asphalt (HMA) Airport Pavements.) In this report, ΔT_c was suggested as a forensic procedure used to evaluate pavements in place from field samples. Many states are now looking at the procedure for material acceptance based on laboratory aging.

Delta Tc is typically stated as $^{\circ}\text{C}$, but this value represents a difference in temperature (Δ) and not a specific temperature. Negative values do not represent a negative temperature but that the parameter is m-critical (creep rate) controlled as opposed to s-critical (creep stiffness) controlled.

The TechBrief outlines the steps suggested by AI IS 240 (State-Of-The-Knowledge: Use of the Delta Tc Parameter to Characterize Asphalt Binder Behavior) as follows:

- Identify the problem ΔT_c is intended to address.
- Determine whether ΔT_c is the most favorable alternative.
- Select aging method to ensure ΔT_c measurements are representative.
- Evaluate existing pavements that exhibit diverse cracking behavior.
- Evaluate ΔT_c results obtained to determine simulative aging protocol.

Ongoing research has indicated that ΔT_c may be used to look at the effect of RAP (reclaimed asphalt pavement) and RAS (reclaimed asphalt shingles) on the properties of the asphalt binder incorporated into a pavement provided that adequate consideration is given to the concern that the recovery process results in total blending of the asphalt cement and this may not be reflected in the field. In addition, the recovery process may also affect the results and the TechBrief suggests that toluene be used as a solvent in conjunction with a rotary evaporator procedure. Laboratory aging of material already aged by production and placement may also affect the results.

There may be difficulties using the parameter with asphalt binders that have been blended with elastomeric polymers. The use of elastomeric polymers tends to increase the elastic component at any given temperature and thus may show a more negative ΔT_c value that does not necessarily equate to more non-load related distress.

Finally, additional research has suggested other parameters that should be considered in concert with ΔT_c such as the Glover-Rowe (GR) parameter. This is a rheological parameter represented by $G^*(\cos\delta)/\sin\delta$ at 15°C and 0.005 radians/second that is determined from binder master curves. The GR parameter is more responsive to stiffness while the ΔT_c parameter is more responsive to relaxation.

As ΔT_c does not necessarily distinguish between good and poor performing elastomeric modified binders, it could be combined with a fracture test, such as the Asphalt Binder Cracking Device (ABCD), to assess the fracture resistance and evaluate durability.

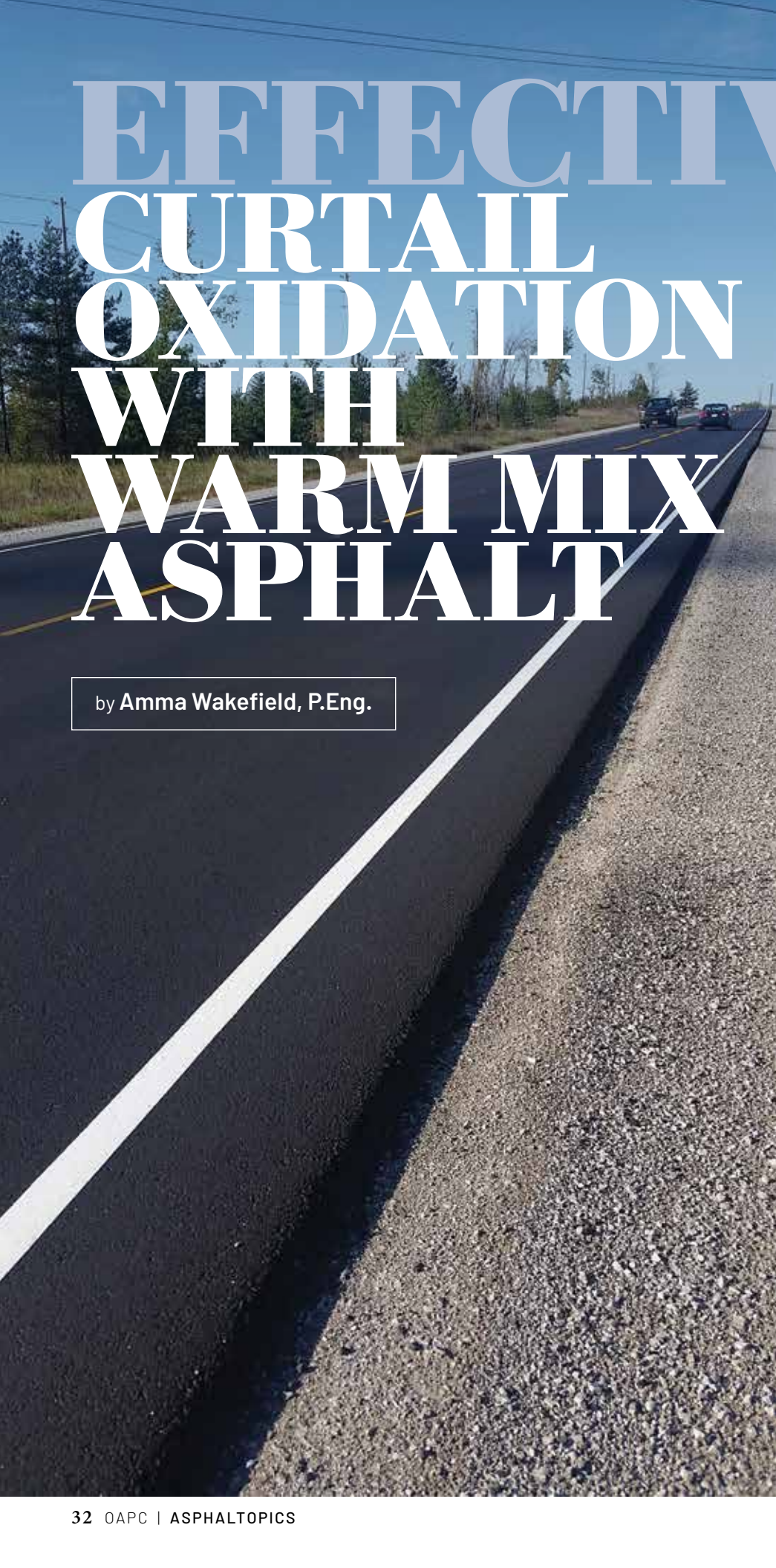
The summary concludes with the following.

The ΔT_c parameter's original intended purpose was forensic in nature as a parameter to stage application of preventative maintenance treatments, it has evolved into something of much broader focus. Among industry professionals there is general acceptance that the ΔT_c parameter is an effective tool to gauge asphalt durability, with general consensus that wider, more negative, values of ΔT_c are highly related to development of block cracking. Use of ΔT_c as a specification parameter is less accepted with most suggesting use be limited to an evaluation tool with -5°C at 20-hours of PAV aging as a limiting value. There appears to be an even split between State DOTs using 20-hour and 40-hour PAV aging protocols, with States in warmer climates (using PG 64-XX binders) tending toward 20-hour PAV aging while States in colder climates (using PG 58-XX binders) preferring 40-hour PAV aging. Of those in favor of implementation of the ΔT_c parameter for specification purposes there is a good starting point with -5°C as a limiting val [sic]. There is not full agreement that this would be universal.

CONCLUSION

The discussion of only two of the recent TechBrief shows that they provide a balanced discussion of relevant current issues facing the paving industry. There are many more topics discussed and TechBriefs provide a convenient summary of complicated research activities. ■

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



EFFECTIVELY CURTAIL OXIDATION WITH WARM MIX ASPHALT

by Amma Wakefield, P.Eng.

A couple of years ago, I was preparing a talk on “What happened to warm mix asphalt?” and I remember getting stuck on the presentation outline in a daydream...

Once upon a time, technical asphalt conferences showcased countless WMA research findings from the lab and field. I happily added my master’s thesis to the knowledge pool when I researched material properties of HMA and chemically-modified WMA.

It is no surprise that there was so much excitement about WMA then, because there are many demonstrated benefits of using WMA including the potential to lower energy demand during production and construction, reduce emissions at the plant and the paver, increase allowable haul distances, reduce thermal segregation, use as a substitute for anti-stripping additives, lower production and paving temperatures, improve compaction and the list goes on.

Two of these benefits of WMA that have long fascinated me are the lower production and paving temperatures of asphalt mix and improved compaction because of their potential impact on the performance and service life of our asphalt pavements. This goes back to our understanding of how asphalt binders age with time in the environment.

Asphalt binders are composed of organic molecules, so they react with oxygen from the environment. This reaction is called oxidation and it is as natural as the browning of an apple or banana when exposed to the air. Oxidation causes the asphalt binder to lose the smaller asphalt molecules, often termed “volatiles” and changes the structure and composition of the asphalt molecules – it becomes stiffer and more brittle. These changes make asphalt pavements more susceptible to cracking.

Even though apples turning brown is inevitable, we often use a few old-fashioned tricks to help slow down this process, and the most important thing is to reduce the apple’s exposure to air. The same principle can be applied, keeping in mind that an asphalt binder’s rate of oxidation depends on temperature and how much oxygen is available to react with the individual asphalt modules. As a rough rule of thumb for very thin films of asphalt, the rate at which oxidation occurs doubles for every 10°C increase in temperature. This increase is compounded, meaning that the rate quadruples for a 20°C increase in temperature. This behavior is illustrated in Figure 1.

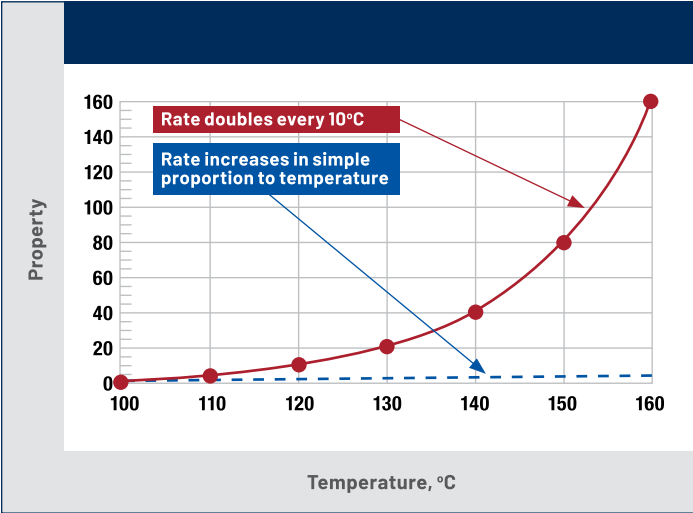


Figure 1: Effect of temperature on property change

This tells us two important things: (1) oxidation rate is highly dependent on a combination of temperature and time; and (2) oxidation is reduced if the access to oxygen is limited.

To discuss what we can use to reduce asphalt binder aging, we have to remember that there are two types of asphalt binder aging, the first is short-term aging, which occurs when the binder is heated to the temperatures used in the laboratory for asphalt mix designs and in the mixing plant during asphalt mix production, up to 350°F (177°C). During mix production, the asphalt binder has the most exposure to oxygen and high temperatures, with asphalt film thicknesses of just a few microns coating heated aggregates. The rate of aging is significantly faster at this stage.

The second type of aging occurs in-service. This is a slower rate of aging and varies depending on the asphalt pavement density, environmental conditions such as temperature, hours of exposure to sunlight and moisture. Laboratory tools used to simulate the short-term aging and long-term aging are respectively the rolling thin film oven (RTFO) and pressure aging vessel (PAV).

How well the asphalt binder performs depends on both its short-term and long-term aging conditions. What can we control from the short-term aging side during asphalt mix production and placement?

SHORT-TERM: REDUCING PRODUCTION AND PLACEMENT TEMPERATURES

Laboratory testing of asphalt binder blends of PG 64-22 has shown that a reduction in short-term aging temperature of 50°F (10°C), reduces asphalt binder mass loss (loss of volatiles) by approximately 40 per cent and asphalt binder aging rate by approximately 30 per cent (Figure 2). If production and paving temperatures can be reduced, what would be the impact on the long-term performance of that asphalt pavement?

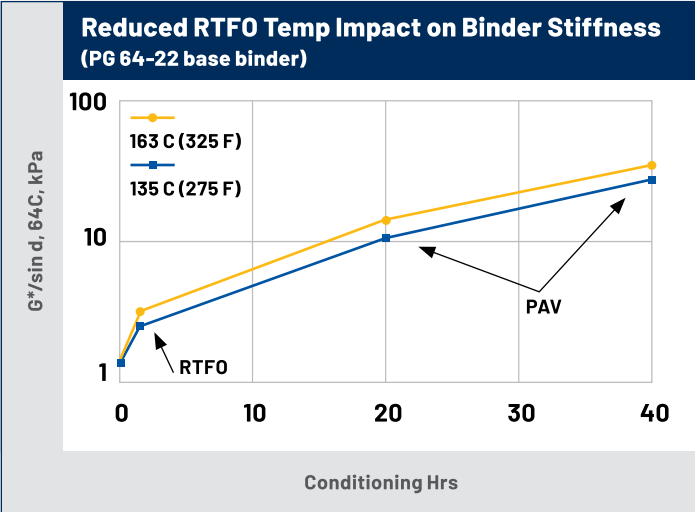


Figure 2: Example of asphalt binder hardening rate with time and temperature for PG 64-22 (Source: Ingevity)

To answer that question, we need to consider testing that estimates the performance of appropriately conditioned asphalt mix samples. Ingevity recently shared performance testing data from TSIT Engineering that compares the rutting (permanent deformation) and cracking performance of dense graded asphalt mixes that addresses this. The various asphalt mixes, listed in Table 1, were produced at the conventional production temperatures (i.e., HMA) and at lower temperatures (i.e., WMA) using two chemical warm mix additives.

Description	Mix (°F)	Compaction (°F)	AC %	WMA Rate %
HMA Ctrl	300	275	5.2	None
HMA Ctrl + 0.2% more AC	300	275	5.4	None
WMA 1	265	240	5.2	Additive 1, 0.5
WMA 2	265	240	5.2	Additive 2, 0.5

Table 1: Asphalt mix parameter used in TSIT testing of HMA and WMA

HMA VS WMA: RUTTING PERFORMANCE

The Hamburg Wheel Tracking device was used to evaluate the rutting performance of the HMA and WMA mixes and showed no significant change in the WMA rutting performance as compared to the HMA. Interestingly, the 0.2 per cent increase in AC for the HMA showed more potential for rutting than the control HMA and WMA mixes (Figure 3). »

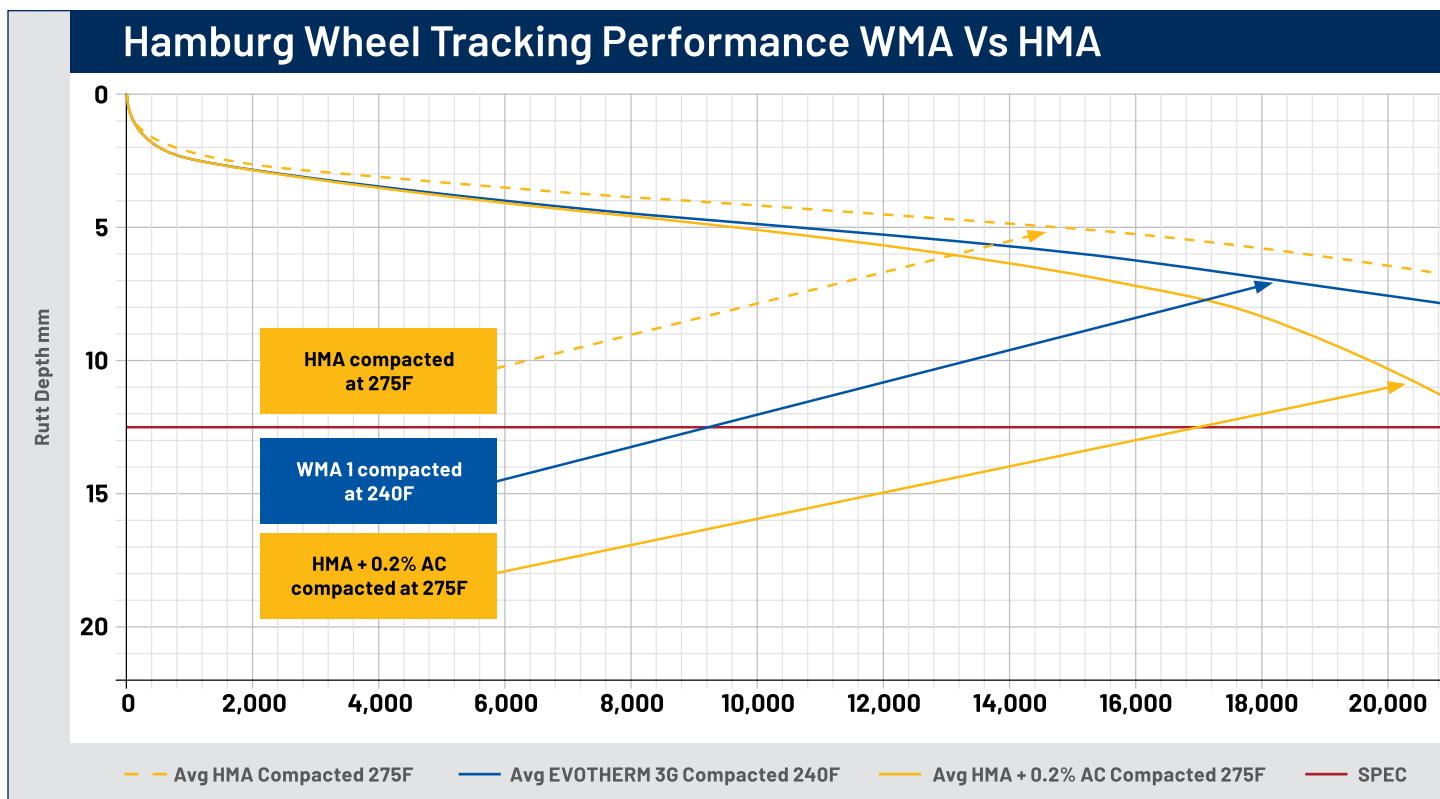


Figure 3: Hamburg Wheel Tracking Performance of HMA and WMA

HMA VS WMA: CRACKING PERFORMANCE

From a cracking standpoint, TSIT used the Indirect Tensile Cracking Test (IDEAL CT) to determine the cracking tolerance index of the asphalt mixes at intermediate temperatures. IDEAL-CT results have been correlated with field performance in terms of fatigue, reflective and thermal cracking with field data collected from the Federal Highway Administration's accelerated load facility (ALF).

The test results from TSIT Engineering showed better cracking performance when the mixes were produced as WMA, and when 0.2 per cent more AC was added to the HMA (Figure 4). Statistically though, the HMA with 0.2 per cent more AC was equivalent in cracking performance compared to the control HMA, and on the average WMA mixes showed better cracking performance by having a higher CT index.

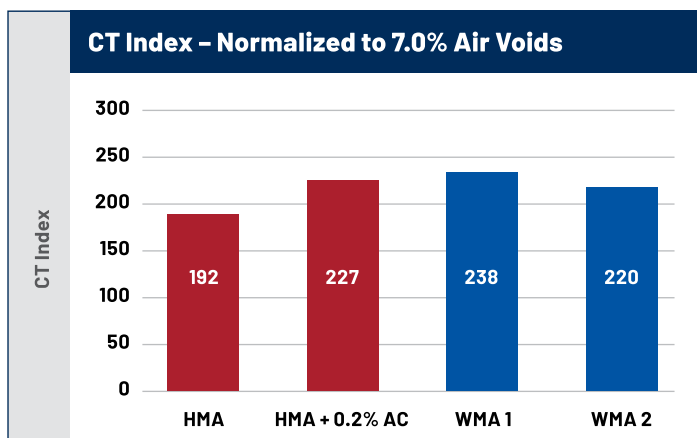


Figure 4: Cracking Tolerance (CT) Index of HMA (Orange) and WMA (Blue) mixes. (Source: Ingevity)

HMA VS. WMA: LOW-TEMPERATURE EVALUATION

To evaluate the low-temperature performance of the HMA and the chemically modified WMA mixes, the asphalt binders were extracted and recovered from the mixtures after short-term aging, to determine their PG high and low failing temperatures (i.e., the PG true grade). The PG low temperatures result in Table 1 show better low-temperature performance for the WMA mixes compared to both HMA mixes. The high-temperature impact is minimal and confirmed by the HWT rutting results.

Description	PG High Temp (°C)	PG Low Temp (°C)
HMA Ctrl	79.7	-23.3
HMA Ctrl + 0.2% more AC	77.2	-23.8
WMA 1	76.7	-25.6
WMA 2	76.9	-25.2

Table 2: Mixture Extraction and Recovery Binder Evaluation of HMA and WMA

These performance test results show overall improved performance when the asphalt mix is produced warm versus hot. Additionally, increasing the binder content in HMA by 0.2 per cent compared to the HMA control did not provide a statistically significant difference in the cracking performance, however, the WMA provided better cracking performance and equal or better rutting resistance than the HMA with 0.2 per cent more asphalt binder.

LONG-TERM: LIMIT ACCESS TO OXYGEN

Now let's consider what can be controlled in-service to limit asphalt binder aging and improve mix performance. Since the

majority of the in-service aging is in the hands of Mother Nature, we can't easily control things like environmental conditions, hours of sunlight, moisture exposure, effects of ultraviolet radiation, etc. What can be controlled is the access to oxygen, by reducing the amount of air in the in-place mat. This can be achieved during the final step in the construction of asphalt pavement – the compaction process – where the freshly placed asphalt mat is compressed (or densified) to reduce the in-place air voids in the mat.

Chemically-modified WMA mixes have been shown to provide better and more consistent compaction than HMA. The WMA additives enhance the lubricating properties of the asphalt binder and allow the mixes to remain workable at even lower temperatures. WMA also remains workable for a longer period than HMA because it doesn't lose heat as quickly to the environment since there isn't as big a difference between the WMA temperature and the ambient temperature.

New Brunswick Department of Transportation and Infrastructure (NB DTI) recently compared core compaction results for HMA and chemically modified WMA projects completed between 2017 and 2019 with PG 58-28 and PG 58-34 asphalt binders. The core compaction results for the HMA projects ranged from 92.5 to 93.0 per cent and the WMA project ranged from 93.5 to 94.5 per cent.

There are many other studies that show the direct relationship between compaction and pavement performance and confirm that obtaining optimum density through the compaction process is essential to long-term pavement performance. Two such studies conducted by Washington and Colorado DOTs both conclude a reduced service life when compaction levels drop below 93 per cent (7 per cent in-place air voids). The presence of air will prematurely oxidize and age the asphalt binder.

These compounding benefits of WMA to effectively limit the rate of oxidation during asphalt mix production and placement and increasing in-place density to limit long-term access to oxygen, has government agencies looking for ways to specify WMA for all contractors to use it. New Brunswick Department of Transportation and Infrastructure adopted WMA for 100 per cent of their asphalt paving projects in 2019 after almost 20 years of successful usage. ■

Amma Wakefield is Asphalt Institute Regional Engineer based in Canada. This article appeared in the summer 2021 issue of Asphalt magazine and is reprinted here with permission from the author and publication.

2022 ORBA ROAD BUILDING ACADEMY

by John Provenzano

“

ORBA ROAD BUILDING ACADEMY 2022 OVERALL



Overall course experience was good or excellent



The course was able to improve knowledge and skills (agree & strongly agree)



Instructor's level of knowledge was good or excellent

"Engaging, covered variety of topics, research-based, example activities / demonstrates helped drive points being made. Felt sense of connection within the group as intended by instructor, which helped with the overall atmosphere of the course."

"The instructor delivered the material with a tremendous amount of enthusiasm which kept me engaged."



ORBA

The 2022 ORBA Road Building Academy was an overwhelming success with just over 300 participants taking part in various courses from February 28 to March 4. Unfortunately, the event had to pivot from an in-person event to a virtual one out of an abundance of caution to protect our members and their employees from the Omicron variant.

As usual, the Road Building Academy brought together world-class instructors and courses from across North America to Ontario. This year's Academy offered 23 courses of which twelve were new. The new courses for 2022 included **Navigating and Promoting Diversity, Equity & Inclusion, Crisis Management, Navigating Supply Chain Risk – Supply Chain Engineering and Deconstruction**. As it relates to technical and safety, new courses covered such topics as **Occupational Health & Safety – The Next Level**, and **Ontario Traffic Manual Book 7 & Traffic Management – For Road Builders by Road Builders**.

The Academy once again offered a certificate in Project Management I in conjunction with the University of Waterloo. New for this year, the Academy offered Project Management II. The curriculum is compatible with the project management industry standard set by the Project Management Institute (PMI) and courses qualify for Professional Developments Units (PDUs)/Contact Hours.

Survey results showed that 94 per cent of respondents said that their overall course experience was good or excellent. Ninety-one per cent agreed and strongly agreed that the course they took was able to improve knowledge and skills. Ninety-nine per cent of respondents said that the instructor's level of knowledge was good or excellent. The only negative comment was that respondents wished that they could have taken the course in-person. This summer, the Education Committee will review the Road Building Academy program and make recommendations to eliminate non-performing courses and to add new and exciting courses to the mix.

Start checking your in-box for registration reminders for the 2023 ORBA Road Building Academy set to take place in-person at the BMO Institute for Learning in Scarborough. ■

COOL PAVEMENT PROJECT IMPLEMENTED IN PHOENIX

by Lara Henry

At the ORBA Summit in February, a panel discussion called *New Ideas: Driving Forward to the Cool, Electric, Integrated and Greener Future* discussed some current trends that are evolving in Canada and internationally. One topic looked at cool pavements and the possible environmental and health advantages to reducing radiant heat from asphalt in urban areas.

Rubben Lolly, Special Projects Administrator, and Ryan Stevens, Civil Engineer III, of the City of Phoenix, Arizona, presented the details of their recent pilot project and full implementation of a cool pavements initiative for the city. In the pilot project, they monitored the installation of a slurry seal type application on existing HMA paved roads that was intended to mitigate the heat island effect. The full panel discussion is available on the ORBA web site and summarized below.

Phoenix, a hot city, is the fifth largest city in the U.S. with 1.6 million residents and an area of 1,346 km² with 7,725 km of roads, 99 per cent of which are asphalt, laid out on a grid system. Two years ago, they carried out a pilot project on 58 km of the road network (~550,000 m²) by applying a coating to the existing pavement with the dual goal of mitigating temperature and maintaining their pavements.

The city already has an active pavement asphalt emulsion sealing program for pavement maintenance and the pilot project innovation was a conversion of the squeegee process to a two-coat spray process for the application of the cool pavement sealing. ASU (Arizona State University) monitored the pilot on a hot summer day and 10 months later using air temperature, pavement surface temperature, and mean radiant temperature using a proprietary platform called MaRTy. The city also carried out aerial thermal photography, subsurface temperature probes and surface reflectivity measurements.

The monitoring indicated that the pavement surface temperature of the cool pavement application was lower by 6.7°C at noon and an average of 5.8°C in the afternoon (5.0 to 8.9°C), 1.3°C at sunrise (0.9 to 1.7°C) and 2.7°C at sunset (2.1 to 3.2°C). This was also evident in the areal daytime thermal photography. However, the areal photography also showed the roofs of the homes were significantly hotter than the pavement whether treated or not, even though the roof was visually lighter in colour than the untreated pavement.

Air temperature over the pavement did not show as marked a difference:

- Daytime air temperature was lower over cool pavement by an average of 0.17°C (0.67 lower to 0.11°C higher)
- Evening air temperature was lower over cool pavement by an average of 0.50°C (0.50 lower to 0.06°C higher)

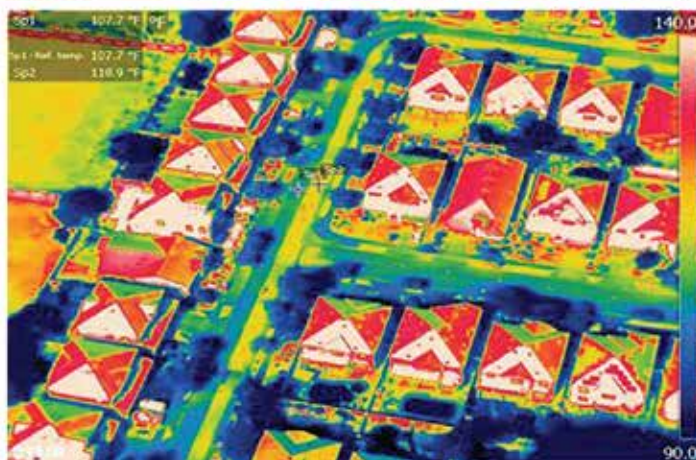
There were several possible issues with the measurements that may explain the minimal effect on air temperatures including:

- Small neighbourhoods with possible air mixing,
- Variability due to shading or vegetation patterns, and
- Variability due to adjacent vegetation (lawns vs xeriscaping, and watering of lawns).

Mean radiant temperature (MRT) measurements (what is felt by people walking on the pavement) were also taken to monitor effects and showed:

- Cool pavement showed higher MRT by 3.1°C (1.4 to 5.1°),
- Untreated pavement absorbs heat and cool pavement has higher surface reflectivity,
- At sunrise and sunset MRT is 0.3°C lower, and
- Cool pavement is similar to walking over a concrete sidewalk.

There was a reference made to the necessary trade-off to reduction in surface temperature to get lower nighttime temperatures but no reference was given to nighttime temperatures in the presentation. Subsurface temperature measured 10 mm below the top and 10 mm above the bottom of a 75 mm thick pavement were 2.8 to 2.6° cooler respectively under the cool pavement surface treatment. The lower gradient may have the potential to have lower thermal stress in the pavement (possible reduction in cracking).



Side-by-side aerial view of the sealing application in normal visible light and infrared thermal image view. Hottest areas are red in the thermal image.

Surface reflectivity measurements indicated that:

- When the cool surface treatment was installed, the surface had a measured reflectivity of 33 to 38%,
- Surface reflectivity decreased to 19 to 33% when measured after 10 months in service, and
- Control pavement with normal surface seal had a reflectivity of 12% when new.

A survey of residents where the pilot project was implemented indicated that while some liked the way the coating looked, others complained that they avoided the pavement because initially the glare was blinding. It was also noted that tire tracks

and oil stains showed up more, making the pavement look worse over time.

Based on the pilot program, the city has moved to full implementation, but intends to use a darker shade of material to address some aesthetic issues with traffic marking and the objectionable high glare reported in the survey. They have no measurements of the effectiveness of the new material.

While this is an interesting technological development, the cost effectiveness of a similar program here would have to be evaluated given that the measured effects reported in the seminar seemed to be minimal and the climate of most Ontario municipalities is neither as hot nor as sunny as Phoenix. ■



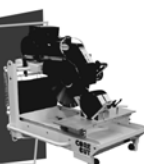
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It's 50 years for Ted Schoen at Cox



Ted Schoen

Ted Schoen admits that when he first started on the job, he didn't envision a long career in the asphalt industry. "You know, you're just a young guy looking for work and you don't think that far into the future," he says about his first days on the job with Cox Construction.

But now, as he looks back on his career, he realizes it was all meant to be, a perfect match that has kept him happy and satisfied and an employer that is glad he has been a loyal team member for all these years.

This year marks the 50th anniversary of Schoen's continuous employment with the Guelph-based Cox. Starting as an eager 20-year-old in 1972, Schoen is marking his anniversary by continuing what he does best — making sure the heavy machinery is well maintained and operating.

Regan Cox, president of Cox Construction, says that Schoen is the type of employee that doesn't come around very often, but when they do, you have to make sure they stay put. "We would like to think Ted has stuck around because he likes it here," says Cox. "But really it's a tight group with a family atmosphere, and Ted has helped make it that way. He's been a big part of what we do for so long. We look at it as him celebrating the 25th anniversary of his 25th anniversary."

Cox says Schoen has made himself valuable by tackling any and all projects that are placed in front of him, whether it's solving problems or managing new machinery. When the company was the first in Canada to acquire a Caterpillar D8N bulldozer in 1987, it was Schoen who was the first to operate it and take care of it. "Ted was right on it; he knew what to do," says Cox. "As an operator or as a heavy mechanic, he always knows what to do."

In 1972, after already having worked in his teens and apprenticing as a mechanic, Schoen found himself in need of a steady job and

made his way to Cox. Starting off as an operator working on a grid packer and then a motor scraper, he still found time to get his mechanic's licence and was asked to help out in the shop during the winter months. "That's when I started working on trucks," Schoen says. "I worked on the trucks in the shop during the winter and headed back out on the road as an operator during the summer months. It kept me pretty busy."

As his quest to learn more about the business continued, an opportunity arrived in 1979 when he was pressed into service to work on all of the heavy equipment. Since then Schoen has seen it all. Trends have come and gone, technology has changed, and he has worked with a lot of people who have transitioned in and out of Cox over the years. All the while he has been the constant, doing his job each day to make sure the operation has run smoothly. "It's the least I can do — they have been good to me here," Schoen says.

Acknowledging that many in the business move around a lot, Schoen says that is not his style. "The grass is not really greener on the other side of the hill," he says. "I've seen people come and go and then come back again to Cox Construction. It's worked out well for me — I've never looked to work anywhere else; never wanted to do that."

These days Schoen says he finds himself doing more office and general repair work and overseeing the duties around the shop. While he certainly expects the summer months to keep him busy, he does expect that come December retirement may be calling. What form that will take is something yet to be determined.

"We'll cross that bridge when we come to it," he says. ■

Steve Pecar is a Mississauga-based writer, editor and designer.



TECHNICALLY SPEAKING

Mike Aurilio

A more resilient and sustainable future for the asphalt paving industry

The use of reclaimed asphalt pavement (RAP) is generally seen as a positive way to reduce the environmental impacts and cost of hot mix asphalt production. The benefits have been discussed at length in the past and it is now evident that increasing our use of RAP should be seen as a priority moving forward. Many jurisdictions around the world have looked at ways to increase RAP usage without having a detrimental impact on the long-term performance of pavements. Learning from these areas can present Ontario with an opportunity to improve RAP usage locally. The Nebraska Department of Transportation, for example, has averaged 39% RAP usage for several years.¹

Asphalt cements and mixes are viscoelastic materials in nature. This means that under certain temperatures and loading conditions the material will exhibit either a viscous-dominated or elastic-dominated behaviour. Therefore, balancing these contradicting properties is necessary for ensuring good pavement performance throughout the entire service life. Rutting resistance mainly comes from the resistance to flow and plastic deformation at higher temperatures and heavier loading conditions. On the other hand, cracking resistance can be influenced and altered in several ways. Among the several possible approaches, increasing the stiffness of the pavement and improving the material response to loading at different temperature ranges (elastic versus viscous) can be named as two common approaches.

There may be a misconception that a higher stiffness means more brittle, which results in overlooking valuable opportunities to improve the durability of our pavements. If properly designed, increasing the stiffness of a pavement structure can potentially reduce fatigue cracking through reducing the critical tensile strain in asphalt layers; however, introducing a stiff material with a brittle behaviour can cause an issue. Asphalt mixes with higher stiffness that maintain the required resilience under loading can be designed effectively using several different techniques.

Binder-related mix properties can be used to control how the material responds to loading. Increasing the asphalt cement content or using a softer binder both promote a more “viscous-like” behaviour that can help with intermediate low temperature properties while SBS polymer modification adds a “rubbery” behaviour which can make the pavement more strain tolerant. By looking at the way a material functions in the pavement structure, it can be realized that a material that is too soft may experience larger strains and become more prone to fatigue cracking. Figure 1 illustrates these different behaviours in a simplified manner. In other words, on the plus side a stiffer material can resist deflection and reduce the level of maximum strain that the material experiences in the pavement where an equivalent softer material will

¹ Hand A, Aschenbrenner T. “Resource Response Use of high RAP (up to 50%) Asphalt Mixtures”, Federal Highway Administration, Webinar, March 24, 2022.

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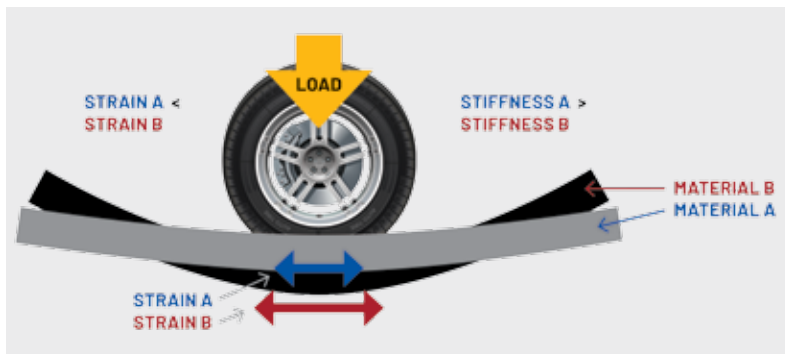


Figure 1: Pavement response to loading

have the opposite behaviour. This larger strain level can accelerate cracking and premature failure of the material.

This brings us back to RAP. Properties of RAP will vary depending on the source and age of the material, but one major characteristic is hardening due to oxidation. Pavement materials will oxidize at different rates. The nominal maximum aggregate size, binder source, presence of additives and permeability introduced by construction quality can impact the rate of oxidation. RAP is a hardened material and introducing this into new mixes must be accommodated properly to ensure performance is maintained. Generally, introducing RAP will relatively increase the stiffness of the mix, which, when designed for can improve the pavement performance.

One of the biggest issues is ensuring that the mix does not react poorly under repeated traffic loading which leads to cracking. Increasing stiffness alone without considering the impact on the material response to loading can prove to be detrimental to performance. Different mix variables can be adjusted to account for RAP and several techniques have been successfully employed by the paving industry across the world to account for this aspect proportional to the amount of RAP used in new mix production. Examples include, but not limited to, base binder grade adjustment, use of rejuvenators, increasing the total binder content while still saving on virgin asphalt usage, changing the nominal maximum aggregate size, and utilizing different types of polymers and additives.

Understanding how to properly adjust mix variables comes from the use of performance tests on mixes. These tests are often sensitive to many different mix attributes like gradation, RAP content, binder content, binder type and aggregate type. Many jurisdictions are using the principles of balanced mix design and performance tests to improve their usage of RAP. The lessons learned from analyzing their mixes have led to design modifications which are deemed necessary to improve the performance of their mixes containing RAP. For example, the development of a high RAP specification in New Jersey² has included an increase to the minimum VMA requirement. This required adjustment may not have been possible without the collection of performance testing data. New Jersey is an excellent example to follow because the same performance testing report »

² Bennert T, Pezeshki D. "Performance testing for HMA Quality Assurance", Federal Highway Administration Report FHWA-NJ-2015-10, (2015).

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found they needed to increase their average asphalt cement content by 0.6% when using RAP to maintain performance relative to virgin mixes. Swiss efforts to recreate French-style High Modulus asphalts using RAP also provide an excellent example of applying these concepts to create new opportunities for innovative paving materials. High Modulus asphalt is designed to be intentionally very stiff and have shown excellent performance in the field. Swiss researchers at EMPA have attempted to recreate these mixes using 100% RAP while evaluating the materials with performance tests. Their initial attempts were unsuccessful, but it's worth learning from the process and willingness to innovate in this area. They were successful in following their standard mix design to produce a 100% RAP surface mix.

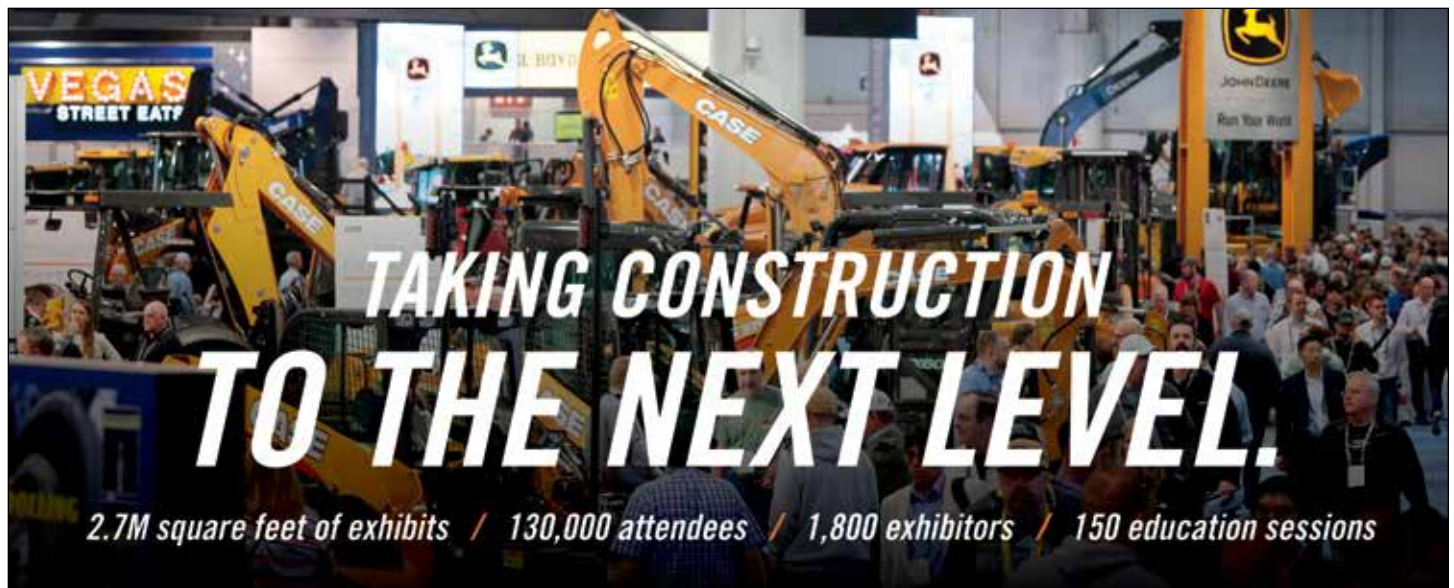
Learning from different regions is a necessity when it comes to improving Ontario's usage of RAP, but we also

need to understand how to utilize the information properly. Conceptually, refining the properties of a mix makes sense for improving performance, but the details of how we do so must be carefully considered. We must find ways to thoroughly understand the implications of our local materials and climate on these concepts to be successful. This is where a well thought out and deliberate experimental plan comes into the picture. Without this type of plan, it becomes very difficult to pinpoint what variables are driving performance and what changes will be optimal in the field. The successful use of RAP will depend heavily on whether we can evaluate performance and our ability to make the required adjustments. ■

Mike Aurilio is Terminal Manager at Yellowline Asphalt Products Ltd.

³ Zaumanis M, Arraigada M, Poulikakos LD. "100% recycled high-modulus asphalt concrete mixture design and validation using vehicle simulator", Construction and Building Materials, 260, (2020).

⁴ Zaumanis M, Arraigada M, Wyss SA, Zeyer K, Cavalli MC, Poulikakos LD. "Performance-based design of 100% recycled hot-mix asphalt and validation using traffic load simulator", Journal of Cleaner Production, 237, (2019).



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2020 Attendee Britton Lawson,
Veit and Company, Inc.



Ryan Smith



Kari Tyler



Stacey O'Sullivan

ENVIRONMENTAL ESSENTIALS

From risk to resilience: road design data for a future climate

The road-building industry is well accustomed to dealing with weather extremes. From hot summers that can lead to pavement rutting and bleeding, to freeze-thaw cycles leading to cracks and potholes, to large rainfall events that overwhelm culverts and ditches, weather is a primary factor in the engineering of resilient and safe roads in Canada.

Today there is an increased awareness of the dangers and risks posed by a changing climate. Canadians are now seeing temperatures that shatter historical records and more frequent extreme rain events. The trillion dollar question for the road-building industry is: how is climate change impacting our roads, and what actions can be taken now to make our roads more resilient to future changes?

To start finding solutions to these challenges, a thorough understanding of the changing climate is required. This is precisely why websites like [ClimateData.ca](#) were created. With [ClimateData.ca](#), Canadians can view, analyze, and download climate change data at a resolution of 10 x 6 km for the entire country.

But, as every engineer and consultant knows, while climate data plays a very important role, by itself it won't tell you how to build a road better. The dedicated [Transportation Module on ClimateData.ca](#) gets you started on the next steps. The module offers a diverse set of case studies and additional resources tailored to engineers, planners, and other members of the transportation sector. The [case studies](#) provide examples of actions already taken to incorporate climate data into decision-making in different parts of Canada. Additional resources to support engineers and design decisions are also linked in the module.

There is also no shortage of one-on-one help available from regional climate service hubs like the [Pacific Climate Impacts Consortium](#), the [Prairie Climate Centre](#), [Ouranos](#), and [CLIMAtlantic](#), and the [Canadian Centre for Climate Services](#) (CCCS), Canada's national climate service provider. If you are having trouble finding what you are looking for on [ClimateData.ca](#), you can also reach out to the [CCCS Climate Services Support Desk](#).

Climate change is happening and will continue to happen – taking action now to reduce risks and boost infrastructure resilience is our collective responsibility. Whether its boosting pavement grades to account for hotter temperatures, designing storm water systems to handle larger peak volumes of rainfall, or building bridges to better withstand localized flooding, taking preemptive action now will save money in the long term and make our roads safer. The tools, datasets, and expert knowledge are available – you just have to reach out and start the process. ■

Ryan Smith, Canadian Centre for Climate Services, Environment and Climate Change Canada; Kari Tyler and Stacey O'Sullivan, Pacific Climate Impacts Consortium.

INDUSTRY NEWS

Thank you to our 2022 Spring Operations Seminar sponsors!

The Spring Operations Seminar took place at the Scarborough Convention Centre on March 24. Please go to OAPC's [website](#) to see the presentations.

We are grateful to our sponsors for their contributions towards the success of this event.

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ORBA WEBINARS

WSIB HEALTH AND SAFETY EXCELLENCE PROGRAM OVERVIEW

Pandemic or not, keeping employees safe and healthy remains of the utmost importance to our association. On April 19, ORBA partnered with the WSIB to bring their Health and Safety Excellence Program to our members. The content focused on showing how participants are able to create their own tailored approach to improving health and safety while earning rebates on their WSIB premiums. We invite everyone to view and share the presentation by visiting [orba.org/orba-webinars](#).



THE LABOUR MARKET GAP: PREPARATION MEETS OPPORTUNITIES

Today's construction industry is faced with a major shortage of skilled labour. One significant component to this challenge is attracting and training young talent while educating them on the opportunities in a construction career. ORBA partnered with Pam Stoneham from Fleming College to show how the college's heavy construction programs are helping to tackle the labour shortages seen in the road-building industry.

Fleming's 12-week program teaches students the operation and preventative maintenance of heavy construction equipment with hands-on learning, ensuring that graduates are job-ready. Students develop the skills to operate bulldozers, rubber-tired loaders, tractor loader backhoes, hydraulic excavators, rock trucks, skid steers, and other construction site equipment. Whether you are looking to hire graduates or enroll students in the program, the presentation is available at [orba.org/orba-webinars](#).



ORBA WEBINAR: BATTLING FUEL COSTS WITH PTO REFUNDS

Are your company's fuel costs rising? Many transport/trucking companies are not taking advantage of the PTO/Fuel Tax Rebates available in Ontario.

For over 23 years, Holly Transportation Services Inc. has been processing these rebates for customers so they can keep working. They handle the 'red tape' so you don't have to. This ORBA Webinar covered how Holly Transportation can save your organization money by providing the expertise and knowledge in determining the PTO refund. The best part is there are no up-front fees. Fees are only paid if a refund is recovered. The webinar recording is available at [orba.org/orba-webinars](#).



Thank you

to our 2022 Partners-in-Quality Seminar sponsors!

The Partners-in-Quality road tour took place from April 7 to 14. Visit OAPC's [website](#) to view the presentations. A huge thank you to our sponsors for making this event possible.

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2022 OAPC AWARD NOMINATIONS DEADLINES

Do you know someone who makes a positive difference in the industry through their leadership, innovation and service? If you do, please consider submitting your nomination for the 2022 OAPC Awards.

NOMINATION SUBMISSION DUE OCTOBER 28, 2022:

- The "Bleeds Black" Award
- Dr. Norman McLeod Award for Innovation

NOMINATION SUBMISSION DUE NOVEMBER 11, 2022:

- Joe Bunting Mentorship Award
- King Beamish Excellence Award
- Earl Kee Volunteer Award
- Honorary Life Membership Award

Please go to the OAPC website for full details.



GOOD ROADS CONFERENCE AND AORS TRADESHOW

Doubra Ambaiowi, ORBA Technical Services Director, represented OAPC in-person this year at the Good Roads conference in Toronto on April 10 and the Association of Ontario Road Supervisors Tradeshow in Barrie on June 1.

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TRILLIUM AWARD APPLICATIONS ARE DUE
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THE LAST WORD

Rob Burlie

Mentoring is key to building our industry

Who would have thought that, 45 years after Mr. Bentley's Civil Technology and Surveying course at Winston Churchill Collegiate Institute in Scarborough, I would be reflecting on my engineering career. Time now for more motorcycling, concerts, fishing and racing.

When I started with MetroTransportation in 1985 after six years at what is now known as Toronto Metropolitan University (former Ryerson) and the University of Ottawa, I knew little about pavement design, materials, construction and maintenance. It was only after spending many nights and summer weekends on the Don Valley Parkway that I gained an appreciation for the quality of work and exacting standards that were demanded by mentors Tom Johnston, Carl Woodman, and the late Romualdo D'Ippolito along with field staff that included John Doherty, Frank Jerina and Myron Tibbits.

I've also benefited from the quality leadership of our ORBA/TARBA/OHMPA colleagues that included Leo McArthur, John Carrick Sr., Dr. Norman McLeod and Keith Davidson (polymers); Les Cruickshank, Bruce Evans and Bruce Flowers (winter snow and ice control and removal); Allan West, Fernando Magisano and Walter Schenk (first contractor HMA QC laboratory); Vern Gazzola (recycling and fractionating RAP); Cosmo, Mike and Frank Crupi (echelon paving to eliminate longitudinal joints); Bent Hudson of Stacey Electric (the importance of hard work and keeping the traffic signals and streetlights operating 24/7); and Rob Bradford (maintaining an open dialogue between municipalities and contractors and authoring *Keeping Ontario Moving: The History of Roads and Road Building in Ontario*).

When challenged with resurfacing Lakeshore Boulevard before the first Molson Indy in 1986, Dr. John Emery and his JEGEL team assisted with the first municipal SMA which was 55% FA/45% CA with polymer modified PGAC 70-28 which is still the best SMA from my perspective. Warren under the leadership of Larry Tanenbaum, George (Joe) Logozzo and Keith Duncan laid down the smoothest SMA that remains in place

some 36 years later. I was fortunate to co-author and present at CTAA with Dr. Emery and win the prestigious OAPC/OHMPA's Earl Kee Award in 1992 for promoting the use of SMA and HMA research in the urban context.

In 2015, I led the Toronto Transportation review of pavement rehabilitation and maintenance practices with adoption of Superpave Plus and WMA specifications. Municipal leaders must support adequate budgets for this important infrastructure and challenge their teams to include life-cycle costing, climate change and asset management in all aspects of tendering road and bridge construction, re-construction and resurfacing. As past president of OGRA in 2016, I know that Good Roads can assist all municipalities with their asset management plans along with rehabilitation and preservation programs. Strategies such as perpetual pavement design, timely crack sealing, hot-in-place recycling, micro surfacing and micro-milling provide longer pavement lives.

Municipalities must understand the global demands on good aggregates and asphalt cement to ensure that through vigorous annual reviews of standards, specifications and enforcement of quality assurance, verification and contractor quality control programs, they are getting the finished product that they tendered. I was fortunate to sit on the OPS Pavement Committee for 22 years reviewing standards to ensure they were current and highly encourage all municipalities to use them whenever possible. Let's also continue our support of the CCIL to ensure that all QA/QC labs are conforming to standard test procedures.

I would challenge all municipal and industry leaders to mentor one of their employees as it is a rewarding experience for both and can rebuild our institutional memory. Lastly, let's assist our high schools, Skilled Trades Ontario, community colleges and universities attract younger, diverse and inclusive people to an exciting road building or municipal career. ■

Rob Burlie is currently looking for further opportunities in the municipal field.

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