



Bridging the Gap: Fostering Collaboration Between Road Builders and Municipal Engineers for Sustainable Transportation Infrastructure in Ontario

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Use of RAP: Fostering Collaboration Between Road Builders and Municipal Engineers for Sustainable Transportation Infrastructure in Ontario

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Presentation Overview

- Good RAP versus C-RAP...
- We Need to Work Together
- What is an EPD?
- Improving Performance AND Environmental Benefits
- OPSS to the Rescue!
- Problems with Consistency
- Recommendations & Final Thoughts
- Questions

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Good RAP is...

- Reasily Available Product
 - We have lots of it...3.6 million tonnes
- Road Agencies Permissive
 - OPSS allows reasonable percentages
- Resource Available Presently
 - No additional environmental impact...
 - Minimal (or no) hauling required
- Really Awsome Product
 - When used responsibly, can improve performance at lower cost and reduced environmental impact

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C-RAP is...

- Consistency of Road Agencies Permitting
 - Specifications and percentages allowed are inconsistent leading to increased cost and complexity
- Can't Reliably Assess Percentage
 - How much is actually in the mix???
- Can't Rely on As-mixed Properties
 - Variability affects volumetrics
- Completely Reduces Actual Performance
 - Improper use of RAP reduces service life

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Let's Work Together...

- We cannot escape the environmental aspects of paving...
 - Extraction of raw/virgin materials not sustainable
 - Green procurement policies are coming (here)
- RAP piles are growing under the current system...
 - 3.6 million tonnes (2023) + 400k tonnes added annually
 - Consumption only +/- 100k tonnes annually
 - Running out of space
- Cost of Virgin materials is rising & sources are dwindling...

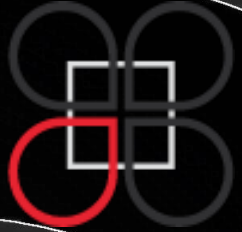
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What is an EPD?

- An Environmental “Nutrition Label” for Construction Materials
 - Tonnes of CO2 Equivalents per tonne of mix (Global Warming Potential)
 - Other metrics include ozone depletion (CFCs), Eutrophication (N), Acidification (SO2), Photochemical ozone creation (O3)
- “Cradle to Gate”
 - Materials (extraction, refining, etc.)
 - Transport (materials to plant)
 - Production (plant operations)
 - NOT transport to site & placement

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EPD “Nutrition” Label

Your Building Product

Amount per Unit

LCA IMACT MEASURES	TOTAL
Primary Energy (MJ)	12.4
Global Warming Potential (kg CO ² eq)	0.96
Ozone Depletion (kg CFC- 11 eq)	1.80E-08
Acidification Potential (mol H ⁺ eq)	0.93
Eutrophication Potential (kg N ⁻ eq)	6.43E-04
Photo-Oxidant Creation Potential (kg O3 eq)	0.121

Your Product’s Ingredients: Listed Here

EPD “nutrition label” for concrete mixes



TABLE 3. ENVIRONMENTAL IMPACT SUMMARY TABLE

IMPACT CATEGORY	POTENTIAL IMPACT PER METRIC TONNE ASPHALT MIXTURE (PER TON ASPHALT MIXTURE)
Global warming potential (GWP-100)	69.72 (63.25) kg CO2 Equiv. 69.72 kg CO2
Ozone depletion potential (ODP)	1.54e-07 (1.23e-07) kg CFC-11 Equiv.
Eutrophication potential (EP)	1.53e-02 (1.38e-02) kg N Equiv.
Acidification potential (AP)	1.90e-01 (1.72e-01) kg SO2 Equiv
Photochemical ozone creation potential (POCP)	4.95 (4.49) kg O3 Equiv.

15% RAP = -8.2% in CO2 equiv.

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IMPACT CATEGORY	POTENTIAL IMPACT PER METRIC TONNE ASPHALT MIXTURE (PER TON ASPHALT MIXTURE)
Global warming potential (GWP-100)	64.06 (58.12) kg CO2 Equiv. 64.06 kg CO2
Ozone depletion potential (ODP)	1.26e-07 (1.14e-07) kg CFC-11 Equiv.
Eutrophication potential (EP)	1.38e-02 (1.25e-02) kg N Equiv.
Acidification potential (AP)	1.73e-01 (1.56e-01) kg SO2 Equiv
Photochemical ozone creation potential (POCP)	4.55 (4.13) kg O3 Equiv.

30% RAP = -16.9% in CO2 equiv.

TABLE 3. ENVIRONMENTAL IMPACT SUMMARY TABLE

IMPACT CATEGORY	POTENTIAL IMPACT PER METRIC TONNE ASPHALT MIXTURE (PER TON ASPHALT MIXTURE)
Global warming potential (GWP-100)	57.95 (52.57) kg CO2 Equiv. 57.95 kg CO2
Ozone depletion potential (ODP)	1.11e-07 (1.00e-07) kg CFC-11 Equiv.
Eutrophication potential (EP)	1.22e-02 (1.10e-02) kg N Equiv.
Acidification potential (AP)	1.51e-01 (1.37e-01) kg SO2 Equiv
Photochemical ozone creation potential (POCP)	4.01 (3.64) kg O3 Equiv.

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Carbon Reduction Policies

- TransformTO Net Zero 2040
 - Strategy for a Circular Economy Baseline Study
 - Identified low diversion rates for C&D waste
- Ottawa Climate Change Master Plan
 - 100% reduction in emissions by 2040
- Region of Durham Low Carbon Pathway
 - 100% reduction in emissions by 2050
- Hamilton Climate Action Strategy
 - Net zero emissions by 2050

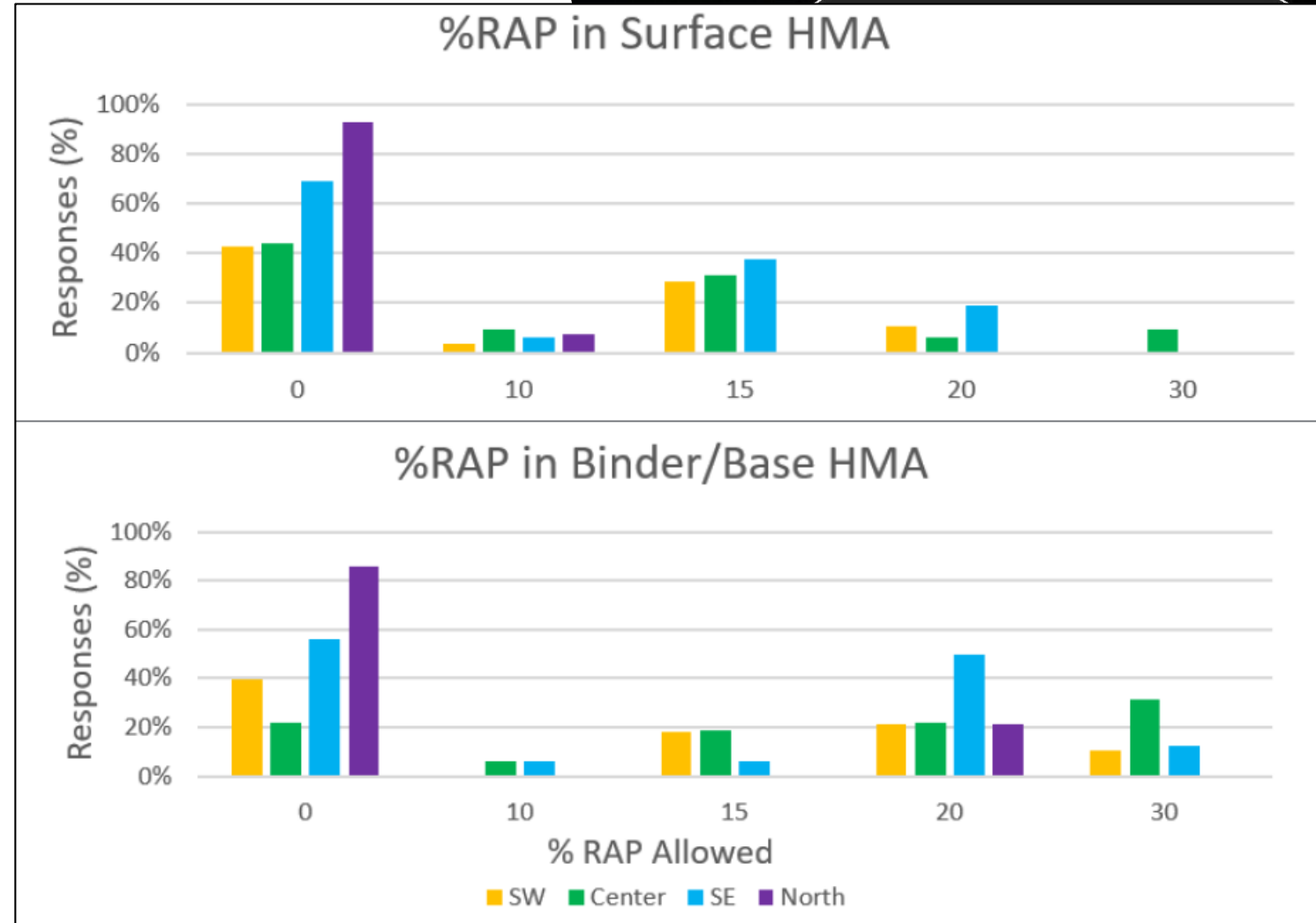
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Don't Fight OPSS...

- 2024 GR/OAPC Municipal Paving Forecast Survey
 - 71% of municipalities permit RAP
 - Northern Region much lower (46%)
- OPSS 1150 / 1151 currently permit 15% in surface and 30% in base (up to 50% can be proposed in 1150 – Appendix D)
- Survey results suggest there is work to be done...

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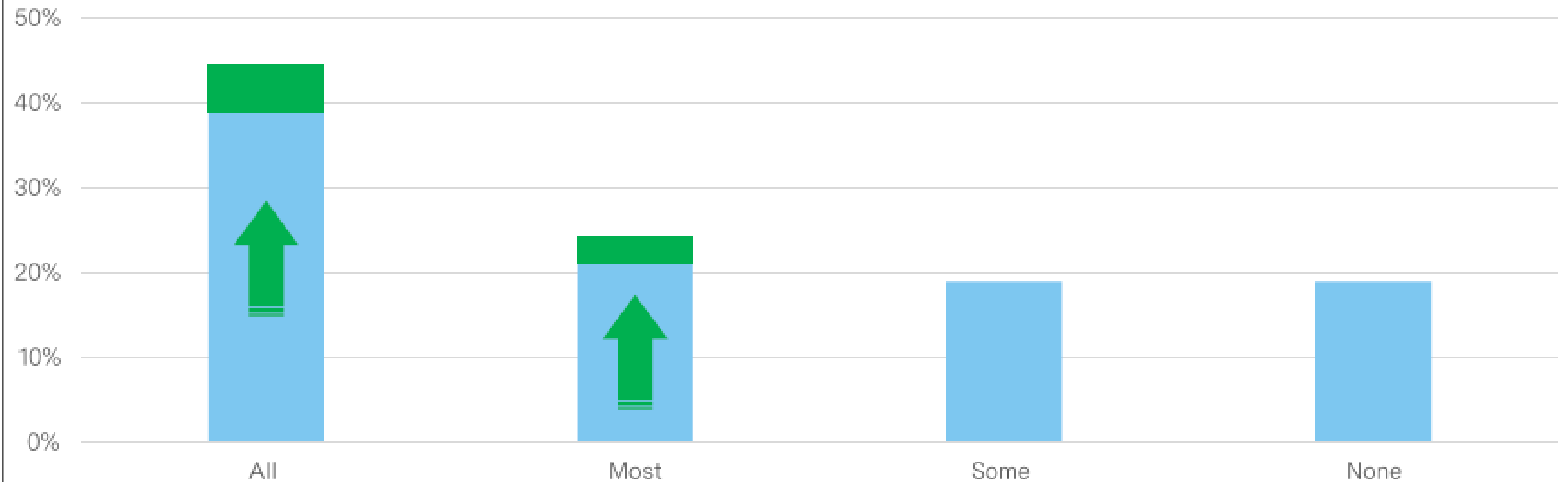
Walk the Talk...

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- 2024 GR/OAPC Municipal Paving Forecast Survey
 - Actual RAP usage in municipal paving projects
 - Slight increase from 2023 to 2024 season (green)

Municipal Paving Projects that Includes RAP (%)



Processing + Sampling = Consistency

- Screening and Fractionating are critical
 - Greater number of fractions, the more consistent
 - Fine RAP has about 1% more AC than coarse RAP
- Moisture Management (-1% moisture = -12% cost)
 - Ideally piles would be placed on a paved surface & covered (maybe just the fine RAP?)
- Sampling & Testing
 - AC Content = 1/1000 tonnes
 - Gradation = 1/1000 tonnes
 - Aggregate BSG = 1/3000 tonnes

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- Read the 2024 Ontario Paving Report
 - Numerous recommendations for processing, stockpiling & testing
- Recognize the opportunity for lower cost, premium materials already in your area
- Lose your RAP baggage...
 - Let go of the one bad project 10 years ago!
- Talk to your Aggregate & HMA Suppliers
 - Discuss their processing, stockpiling & testing programs
- Adopt OPSS limits for RAP
 - Consistent specifications = lower costs
 - Quality requirements already in-place
- Confirm Consistency and Quality
 - Do your own sampling and testing (QA)
- Request EPDs for your local mixes

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Final Thoughts - Harmonization of HMA Mixes

- Each municipality doesn't need special HMA mixes – your traffic is not that different...
 - Superpave vs. Marshall, AC contents, etc., etc.
- Too many mixes increases costs and complexity, with associated risk of reduced quality
- Results in increased waste, GHG emissions & plant downtime
- City of Ottawa has reduced number of mixes by only using Level B, D & E
 - Smaller municipalities may consider A & B only
- Consider using only 1 mix on projects with multiple traffic levels
 - Increased quantity = lower unit price

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Questions?

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