

The Road Ahead: Plastics in Asphalt

OAPC – 2021 Asphalt Technical Symposium (ATS) Webinar
June 15, 2021

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- Bachelors of Engineering – Materials Engineering
 - McMaster University
- Began career in a Mix Design Lab in 2006
- Master of Applied Science - Civil Engineering (2011)
 - University of Waterloo
- Managed QC, QMS, and Corporate Research & Mix Design Lab for Miller Paving Limited (6 years)
- Currently Canadian Regional Engineer for the Asphalt Institute, since January 2018

Background

Plastic is not the first waste product that has been researched as an additive or modifier to asphalt.

Common misconceptions: all waste plastic is the same, consistent and appropriate for use in asphalt.

This simply is not true.



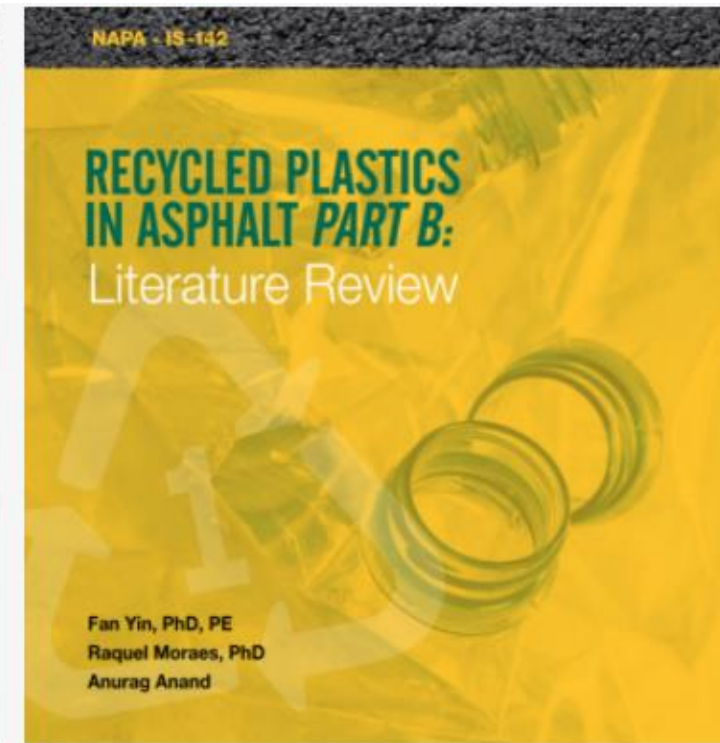
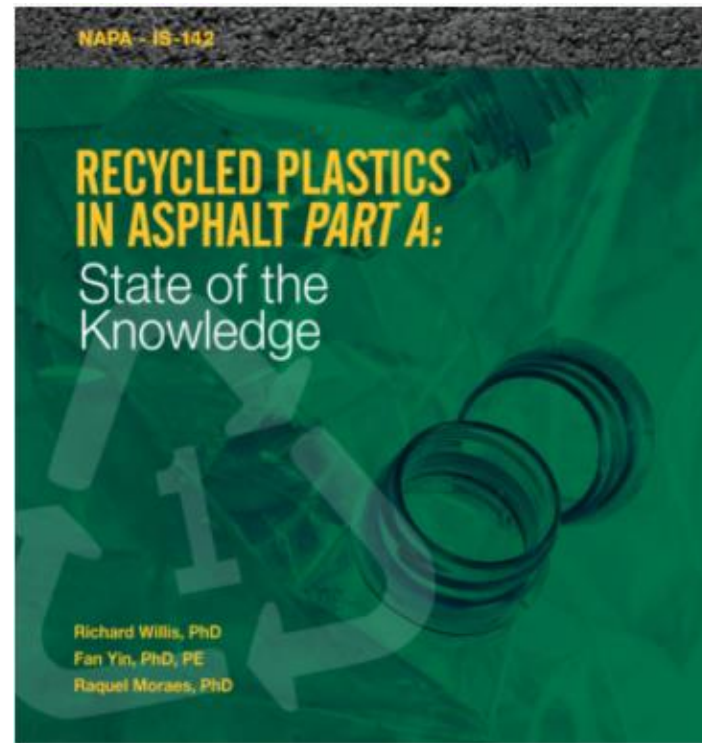
Literature Review

A joint Asphalt Institute/NAPA task force formed in late 2019 to address the topic of recycled plastics in asphalt.

Objective:

Develop a document to compile the literature and describe current state of the knowledge while identifying knowledge gaps and future research needs.

Completed in November 2020 with the release of two documents:



- Wet method
 - Blended with asphalt binder
 - Up to 8% by weight of binder

- Dry method
 - Aggregate replacement/mixture modifier
 - Up to 1% of aggregate weight

- Literature shows plastic had a stiffening effect on the binder
 - Potentially improve rutting resistance
 - Very few studies examine binder properties related to fatigue or low-temperature cracking

Knowledge Gaps

- Sourcing
- Dry Process
- Wet Process
- Environmental
- Field Performance

- **Sourcing**

- Research is needed around waste plastic sourcing and recycling process for type, availability, consistency and cleanliness.

- Dry Process

- Wet Process

- Environmental

- Field Performance

- Sourcing
- **Dry Process**
 - What production parameters affect dispersion, plastic coating of the aggregate and the extent of mix modification?
 - How much modification occurs to the virgin binder?
 - How are key mix volumetric properties affected)?
 - How are plant production, field constructability and workability affected?
- Wet Process
- Environmental
- Field Performance

- Sourcing
- Dry Process
- **Wet Process**
 - Storage separation issues
 - How will standard binder testing procedures be modified to properly characterize plastic modified binders?
 - Compatible with anti-stripping additives, WMA, recycling agents?
 - Fatigue and low-temperature cracking properties?
 - Certain types of plastics are insoluble in solvents commonly used for extraction and recovery for lab characterization.
- Environmental
- Field Performance

- Sourcing
- Dry Process
- Wet Process
- **Environmental**
 - Are microplastics generated and released in the air from milling?
 - Can RAP from mixtures with plastic be run through a plant without concern for hazardous emissions?
 - Are there other plant issues such as coating the baghouse with plastic fines?
 - Will there be leachates or microplastics from in-service plastic roads or RAP stockpiles containing plastic?
- Field Performance

- Sourcing
- Dry Process
- Wet Process
- Environmental
- **Field Performance**
 - Needs more thorough and comprehensive evaluation.

