

Feature Presentation

NJDOT Sustainability Initiatives

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NJDOT INITIATIVES FOR SUSTAINABILITY IN PAVEMENTS

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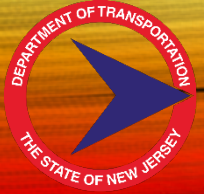


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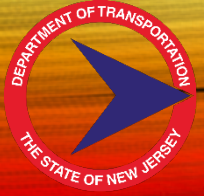
OVERVIEW

- Sustainability in Pavements
- Recycled Scrap Rubber Tires
- Recycling Reclaimed Asphalt Pavement (RAP)
- Recycled Plastic Waste
- Summary



SUSTAINABILITY



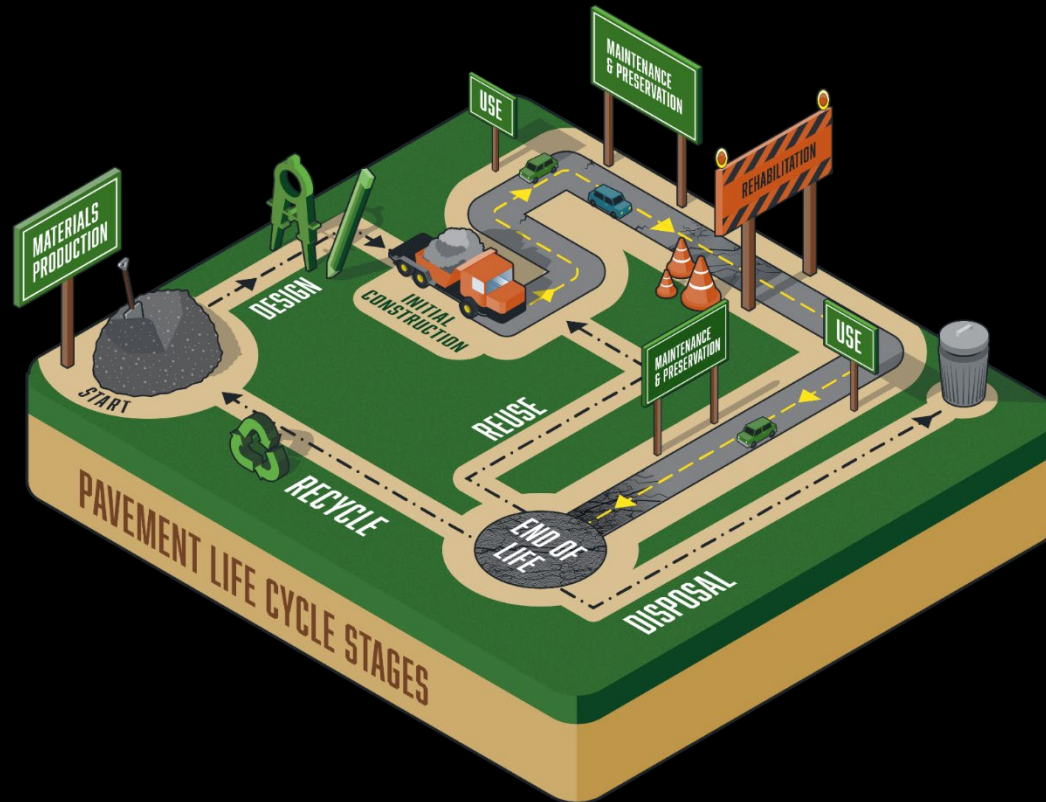


SUSTAINABLE PAVEMENTS DEFINED

- Achieve the engineering goals.
- Preserve and (ideally) restore surrounding ecosystems.
- Use financial, human, and environmental resources wisely.
- Meet basic human needs such as health, safety, equity, employment, comfort, and happiness.



OPPORTUNITIES FOR IMPROVING SUSTAINABILITY



Pavement Life Cycle Stages

- Materials
- Design
- Construction
- Use
- Maintenance/Preservation
- End of Life

Image Source: FHWA/APTech

BENEFITS OF BEING MORE SUSTAINABLE



- Reduced pavement life-cycle costs



- Reduction in greenhouse gas emissions
- Reduced energy
- Reduced noise



- Improved safety
- Improved ride quality
- Conservation of resources





RECYCLED SCRAP RUBBER TIRES

WHY RUBBER IN PAVEMENTS?

- Engineered waste product
- Tire rubber contains polymers
 - Increase asphalt binder viscosity
 - Increase film thickness on aggregates
 - Increase durability, rutting resistance, and cracking resistance



WHY RUBBER IN PAVEMENTS?



- Reduce landfill (11% goes to landfill)
- Prevent pollution
 - Water
 - Air – tire fires, methane gas
- Prevent Diseases from Pests
 - Mosquitoes
 - Rodents

ASPHALT RUBBER

- “Wet” Process of blending ground recycled tire rubber (GTR)
- ASTM D 6114 (15% minimum GTR)
- **Asphalt Rubber Open Graded Friction Course (AR-OGFC)**
- **Asphalt Rubber Gap Graded Courses**
- **Asphalt Rubber Chip Seal**
- Can recycle up to 1,000 tires per lane mile



ASPHALT RUBBER "WET" PROCESS



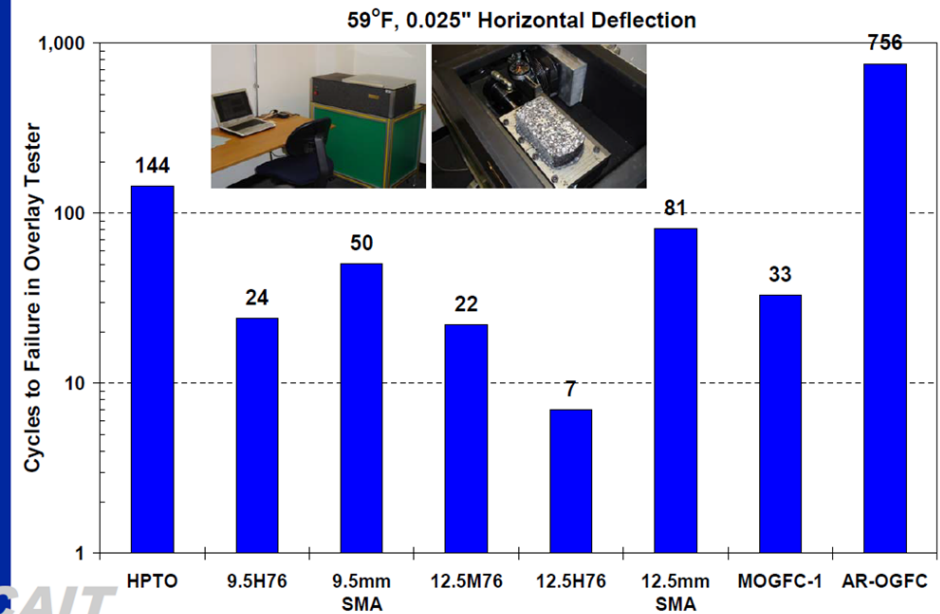
ASPHALT RUBBER "WET" PROCESS



I-295 MERCER COUNTY ASPHALT RUBBER-OPEN GRADED FRICTION COURSE (2007)



NJDOT Surface Course Mixes



CAIT
RUTGERS

ROUTE 72 OCEAN COUNTY ASPHALT RUBBER GAP GRADED (2014)



ROUTE 68 BURLINGTON COUNTY ASPHALT RUBBER CHIP SEAL (2018)





RECYCLING RECLAIMED ASPHALT PAVEMENT (RAP)

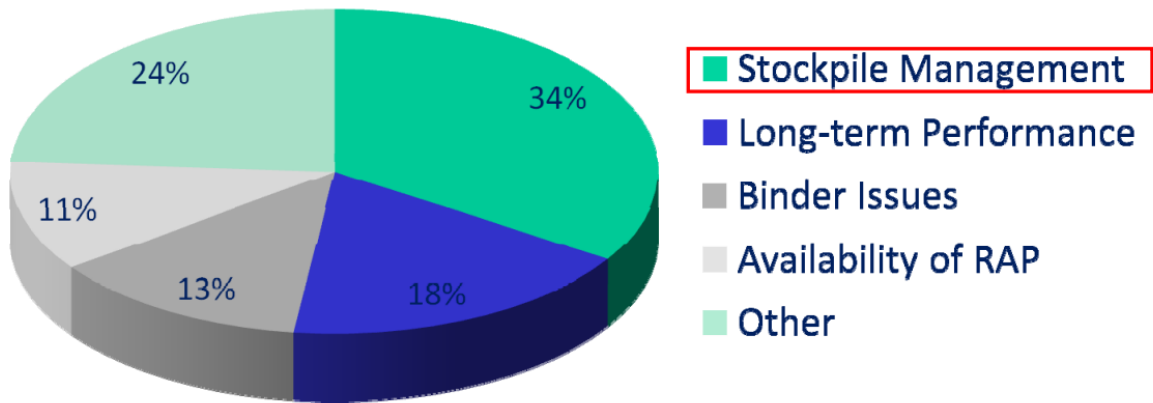
WHY HIGH RECLAIMED ASPHALT PAVEMENT (RAP)?



- Engineered waste product
- Reduce virgin material use
- Reduce energy consumption and emissions
- If done correctly
 - Economically Sustainable
 - Environmentally Sustainable
 - Long Term Performance

WHY HIGH RECLAIMED ASPHALT PAVEMENT (RAP)?

Barriers to Increasing RAP



I-295 SOUTHBOUND GLOUCESTER COUNTY HOT MIX ASPHALT (HMA) HIGH RAP (2012)



- NJDOT HMA High RAP Specification
 - Minimum 20% RAP Surface Course
 - Minimum 30% RAP Intermediate/Base Course
 - HMA High RAP must meet performance testing
- Successful pilot project
- High RAP can be done, IF IT IS DONE THE RIGHT WAY
- QUALITY AND LONG-TERM PERFORMANCE



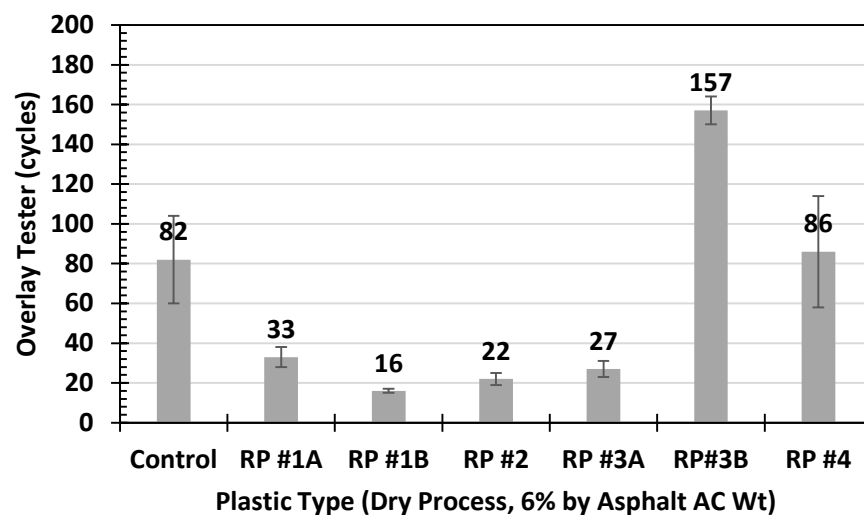
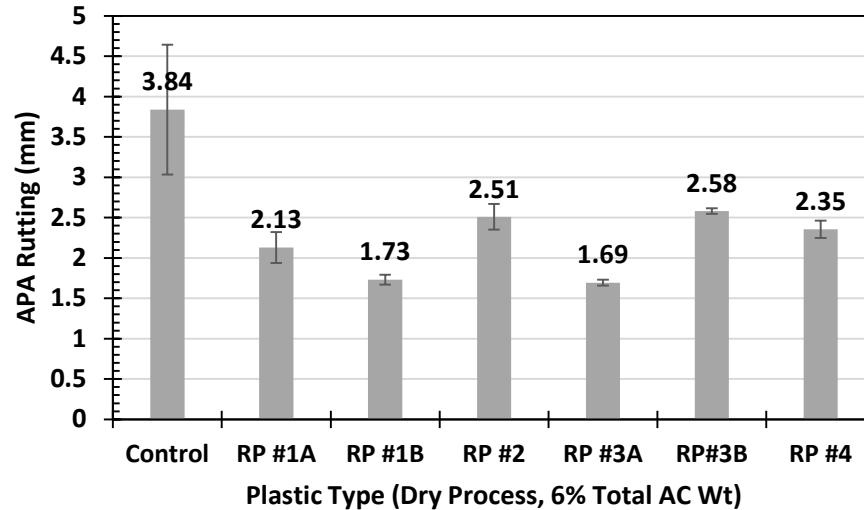
RECYCLED PLASTIC WASTE

WHY RECYCLED PLASTIC IN PAVEMENT?

- China stopped accepting plastic waste in 2018
 - 45% of global plastic
 - Greater than 100 million metric tons annually
- Reduce landfill/pollution
- Challenges
 - Not all plastics are suitable for asphalt
 - Safety and environmental risks



WHY RECYCLED PLASTIC IN PAVEMENT?



- Ongoing global research
 - Asphalt Institute, National Asphalt Pavement Association, and National Center for Asphalt Technology
 - Complex waste stream
 - Many knowledge gaps
- Evaluation of the Potential Use of Recycled Plastics as an Asphalt Mixture Modifier
 - Rutgers - CAIT Pavement Support Program (PSP)

“PLASTIC IS NOT THE FIRST WASTE PRODUCT THAT HAS BEEN RESEARCHED AS AN ADDITIVE OR MODIFIER TO ASPHALT (I.E. [RAP,] SHINGLES, CRUMB RUBBER, ETC.). LIKE ALL OF THEM, ENGINEERING AND SCIENCE MUST LEAD THE WAY IN DETERMINING THE MOST COST-EFFECTIVE AND SUSTAINABLE SOLUTION WHICH CERTAINLY INCLUDES LONG-TERM PERFORMANCE.”

Dr. Mark Buncher, Ph.D., P.E.

Asphalt Institute Direct of Engineering

SUMMARY

- We can use recycled products in pavements, but we **must** make sure engineering experts and scientists drive logical decisions based on sound and thorough research to avoid unintended failures.
- Research, standards, and governance
- Quality
- Health, safety, and environmental stewardship
- Long-term performance
- Sustainability



THANK YOU!

QUESTIONS

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