RowanUniversity
CENTER FOR RESEARCH & EDUCATION IN ADVANCED TRANSPORTATION ENGINEERING SYSTEMS

Full-Scale Accelerated Pavement Testing of a Plastic-Modified Asphalt Mixture

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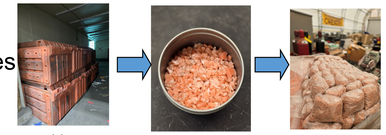
Background & Goal of the study

- Growing interest in using recycled plastics to modify asphalt mixtures addresses both performance challenges and the environmental issue.
- Although having substantial research on plastic modified asphalt binders and mixtures, full-scale accelerated pavement testing performance evaluation and effective incorporation method in plant level to produce plastic modified pavements are yet limited.

Goal of the study: Produce, instrument, and construct full-scale pavement sections using plastic modified Asphalt Mixtures, and evaluate field rutting, fatigue and thermal cracking performance.

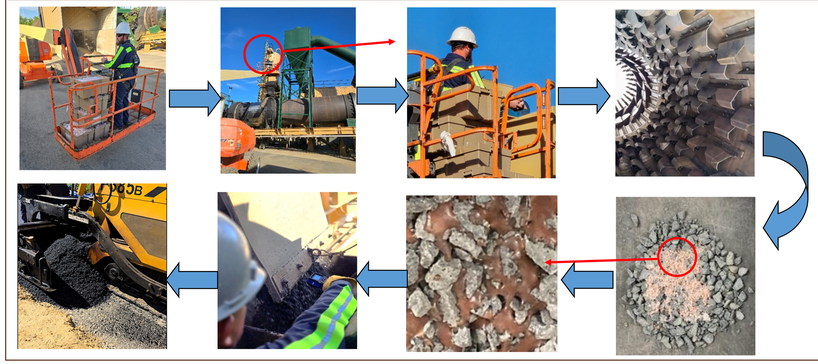
Materials & Mix Design

- Asphalt Binders: PG 64-22
- Gradation: Type-III 9.5 mm NMAS aggregate gradation (Unified Facilities Guide Specifications: UFGS 32 12 16.16)
- Two full-scale pavement sections (200 ft × 12 ft × 5 in.)



(a) USPS postal cart (LDPE) (b) Shredded plastics (c) Packing of plastics

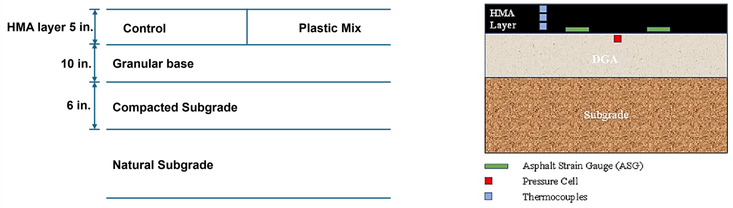
Dry Mixing Methodology



Construction of Field Section



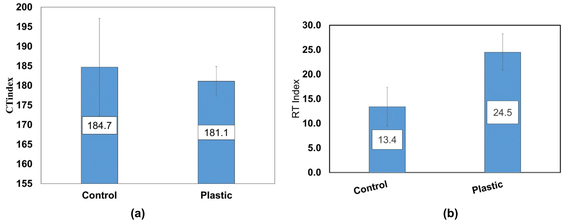
Pavement Instrumentation



(a) Design thicknesses (b) Instrumentation plan: Cross sectional view of sensors

Laboratory Investigation

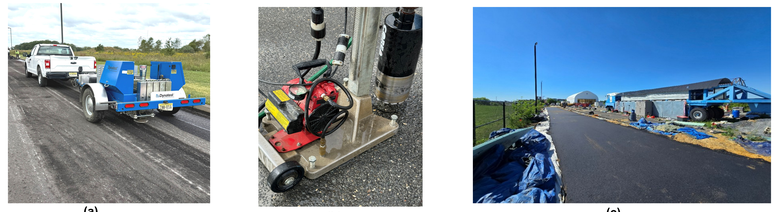




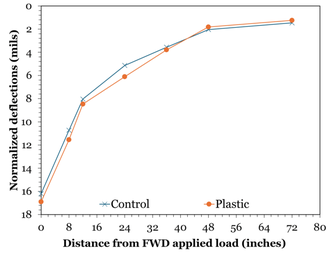
IDEAL CT (ASTM D8225), Temp 25℃, P value = 0.602 > 0.05
IDEAL RT, Temp 64℃, P value = 0.02 < 0.05

(a) IDEAL-CT (b) IDEAL-RT QA/QC tests on control and plastic modified plant mixes.

Performance Monitoring and Evaluation



(a) FWD testing (b) Collection of cores for DCM testing (c)Preparation of HVS loading



Section	D1	D2	D3	D4	D5	D6	D7
Control	16.20	10.72	8.03	5.14	3.56	2.04	1.46
Plastic	16.90	11.54	8.47	6.11	3.79	1.82	1.25

Deflection basin from FWD testing for control and plastic modified section

Conclusions

- Plastic modification improved the rutting resistance more than 150% compared to unmodified (control) section.
- Comparable performance in Intermediate temperature cracking (No statistical significant difference) and FWD structural performance based on average deflection have been observed with control and plastic modified section.

Acknowledgement

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