

Performance Testing of Hot Mix Asphalt Modified with Recycled Waste Plastic

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Plastic waste pollution is one of the major concerns in the world. The pavement industry has the potential to facilitate the reuse of recycled waste plastics in hot mix asphalt (HMA). Reclaimed Asphalt Pavement (RAP) is also highly used in HMA to preserve resources. With the objective of investigating whether waste plastic can be effectively used to channel these waste plastic materials into sustainable and safe paving solution, HMA was modified with RAP as well as recycled waste plastic and tested in isolation and combination. The fatigue cracking resistance and rutting resistance were tested between the conventional and modified HMA.

Study Methods

Researchers prepared a conventional HMA and modified HMA with recycled waste plastic and RAP, separately and together. Mechanical properties, fatigue cracking resistance, and rutting resistance were tested. Researchers selected the IDEAL Cracking Test to test fatigue cracking resistance and the Hamburg Wheel Tracking Test to test rutting

resistance. The IDEAL Cracking test was conducted according to ASTM D8225. Similarly, AASHTO T324 was used for Hamburg Wheel Tracking Test. The results between conventional and modified HMA were compared to draw conclusions.

Findings

The key findings were as follows:

- Conventional HMA modified with the addition of recycled waste plastics showed similar fatigue cracking resistance.
- Fatigue cracking resistance decreased when recycled waste plastics were used as additives to HMA containing 20% of RAP aggregates.
- Rutting resistance remains similar in plastic modified and conventional HMA with or without 20% of RAP aggregates.

Policy/Practice Recommendations

The addition of 1.5% of recycled waste plastics (linear low-density polyethylene) showed similar fatigue cracking resistance and rutting resistance of HMA containing virgin aggregate. Recycled waste plastic can be used to partially substitute the binder to produce similar fatigue cracking resistance and rutting resistance. This can help to manage the plastic waste and also reduce the materials costs in the pavement project.

Recycled waste plastic can be used to partially substitute the binder to produce similar fatigue cracking resistance and rutting resistance.

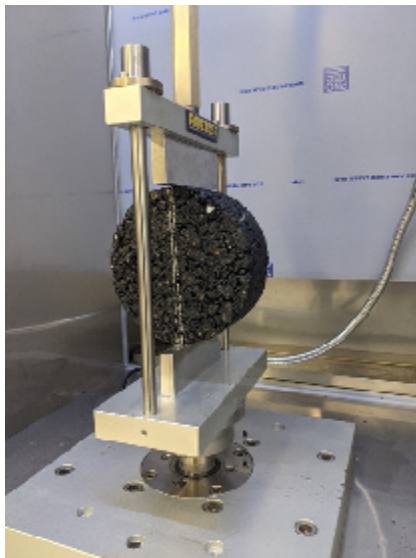


Figure 1. IDEAL Cracking Test Samples During Testing

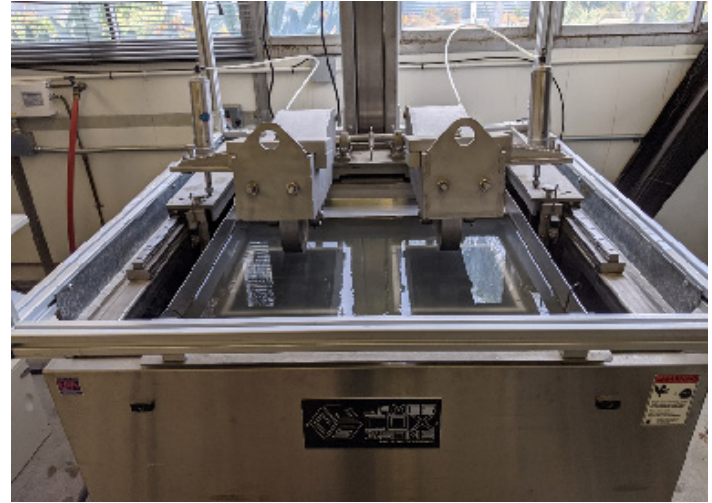


Figure 2. HWT Samples During Testing

About the Authors

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To Learn More

For more details about the study, download the full report at transweb.sjsu.edu/research/2045



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