Forensic Evaluation of Field Performance of 100% Reclaimed Asphalt Pavement Cold Mix with Rejuvenator in a Low Volume Road

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Abstract

Utilization of reclaimed asphalt pavement (RAP) at lower production temperature is a sustainable technology in asphalt industry. This study provides a forensic evaluation on a low road in Florida that used 100% RAP cold mix with a rejuvenator. Two field distress surveys were completed after 7 and 22 months of service, and the effect of staged construction and edge compaction on the road conditions were evaluated. Alongside the field survey, the asphalt mixture properties were analyzed in terms of field cores' volumetric properties, Cantabro loss, Hamburg Wheel Tracking, indirect tensile resilient modulus, and fracture tests. The ride quality was good, but the main distresses were weathering and raveling. It was determined that the field cores had high air voids, resulting in high Cantabro loss, which is consistent with field raveling observation. The Hamburg wheel tracking test results showed that rutting resistance and moisture resistance are good for 100% RAP cold mix with rejuvenator. To improve field performance, it is recommended to mix and compact 100% RAP cold mix with rejuvenator on the same day, as well as improve compaction on the edge to achieve higher in-place density.

Objective

The objective of this study is to evaluate the field performance of 100% RAP cold mix with a cold applied rejuvenating technology for a low volume road in Florida.

Project

Location

Construction: Windrow method

Materials

- Local RAP: Asphalt content of 4%, Nominal maximum size of 9.5 mm
- Rejuvenator: Bio-synthetic oil – petroleum mixture, specific gravity of 0.929, boiling point of 424 – 687°F, brown liquid, with a musty petroleum odor; dosed at 2.6 gallons per tons of RAP

Experiment Plan

(a) Locations of all ten cores
(b) Trimming cores
(c) Drying cores

Results and Discussions

Effect of Staged Construction on Road Condition

2(7) IDT resilient modulus
3(7) IDT Fracture Test

Table 6. Results of Cantabro Loss

Table 7. IDT Results of Field Cores

Conclusions

Utilization of 100% RAP with rejuvenator as a cold mix is currently not viewed as a solution for interstate mixtures but may serve a cost-effective and simple solution to implement in low volume roads for tight budgets of counties and local agencies. This study evaluates the performance of 100% RAP cold mix with rejuvenator in Santa Rosa Beach, FL. It is recommended to improve field roller compaction to achieve higher in-place density on the cold mix construction. It is recommended to evaluate the durability and raveling resistance of cold mix in the mix design stage and in the quality control plan.

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