

Trial Surface Mix With 50% RAP And Rejuvenator May Help Cut Stockpiles

By Paul Fournier

The performance of a trial highway pavement installed by a Georgia contractor seeking to reduce its stockpiles of recycled asphalt pavement (RAP) may have important ramifications for efforts to slash growing national inventories.

C.W. Matthews substituted experimental wearing surfaces for standard hot mix asphalt (HMA) planned for the 1-1/2-inch mill-and-fill of portions of Georgia State Route 42 Spur. The trial mixes contained up to 50% RAP and various percentages of liquid asphalt binder with, and without, an asphalt rejuvenator.

The contractor hopes to develop a mix design that uses high-RAP content but doesn't cause premature cracking. This would allow the use of more RAP and draw down stockpiles. Matthews has about 200,000 tons of RAP stockpiled at its Forest Park asphalt plant and approximately three million tons distributed among 25 plants in Metro-Atlanta.

Matthews' growing RAP stockpiles mirror rising national inventories. While producers currently incorporate about 21% RAP in pavement applications, more RAP is being stockpiled than used. Approximately 102 million tons of RAP was stockpiled nationwide in 2017, according to the National Asphalt Pavement Association.

The Georgia DOT helped the contractor set up the field trial, while the National Center for Asphalt Technology designed trial mixes.

The experiment employed a dense-graded 12.5mm SUPERPAVE wearing course design, with 1/2-inch maximum aggregate and 7% fines passing #200 sieve. All sections used PG 64-22 asphalt binder.

The rejuvenator selected for the trial was Delta S, a non-toxic, organic plant-based liquid chemistry invented by Warner Babcock Institute for Green Chemistry, and supplied by Collaborative Aggregates LLC, an affiliate based in Wilmington, Mass. A rejuvenator is included in the experiment to monitor its effectiveness in offsetting lower crack resistance of aged asphalt embedded in RAP.

Matthews had previously produced a 35% RAP SUPERPAVE design that Georgia DOT approved, so the contractor used this as experiment control. The combined liquid asphalt binder for the control section was 5.5%.

All mixes were produced at Matthews' Forest Park facility, an Astec drum mix plant capable of delivering up to 500 tons per hour.



A second section utilized 50% RAP, was dosed with Delta S at the rate of 2.8 pounds per ton of HMA, and utilized 5.7% combined liquid asphalt.

The third section incorporated 50% RAP, contained no rejuvenator, and utilized 6.1% combined liquid asphalt.

All mixes were produced at Matthews' Forest Park facility, an Astec drum mix plant capable of delivering up to 500 tons per hour.

Asphalt mixes were manufactured at temperatures between 290° and 310° Fahrenheit at the Forest Park plant and were hauled approximately 9.5 miles to the job site. Previously, a ROADTEC RX 600E cold planer had milled off 1-1/2 inches of existing wearing course. Trucks deposited HMA into a Weiler Materials Transfer Vehicle that conveyed mix to a ROADTEC RP-190E paver.

Three rollers performed compaction – initial breakdown by a HAMM HD-140 15-ton steel drum in vibratory mode; intermediate compaction by a CAT rubber tired roller; and finish compaction by a HAMM HD-90 10-ton steel drum roller in static mode.



Delta S asphalt rejuvenator is pumped directly into a tank truck containing PG 64-22 liquid asphalt.

Matthews' executives hope the trial will advance high-RAP-content surface pavement designs containing optimal percentages of RAP and asphalt binder, which would prevent cracking while resulting in greater use of RAP and significant draw down of stockpiles.



Paving crew employs a ROADTEC RP-190E paving machine to install 1-1/2-inches of experimental wearing surfaces on selected sections of Georgia State Route 42 Spur.