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Once in place . . .

First recycling effort in Pa., N.J., turns heads

Alaska is not particularly known for its thaws.

However, officials in the northeast U.S. are starting to warm up to the idea of cold in-place recycling, and the 49th state of the union has helped in providing layers of encouragement for the process. When a chronic crumbling condition was finally getting the best of Rte. 202 between Solebury Township, Pa., and Delaware Township, N.J., Greg Bitsko retraced his experience back to the days when he worked for Monmouth County, N.J., reached out to Wirtgen rep

Mike Marshall and then started talking to the Alaska DOT. About 12 years ago, Bitsko was working on a bridge project when he first heard of foamed asphalt.

"We were detouring traffic on a local road, and it was in such bad shape we looked at the cost of replacing it, and it was as much [with conventional hot-mix asphalt] as rebuilding the bridge," Bitsko, who is a senior director of structural engineering for Cherry, Weber & Associates, told *ROADS & BRIDGES*, "so [foamed asphalt] came up and we tried it. It worked out pretty well."

But not so well that the region was willing to take a plunge into the idea of

pavement recycling, which was still a relative unknown. Then the issues with Rte. 202 popped up, and Bitsko was ready with an answer. Cherry, Weber & Associates, under contract with the Delaware River Joint Toll Bridge Commission (DRJTBC) to design roadway improvements on Rte. 202, approached the commission about using foamed cold in-place recycling (CIR). The owner had some reservations that needed to be addressed. Since few contractors specialized in the process, DRJTBC was concerned there would be little competition during the bid process. In the end, however, foamed CIR may be the one in high demand, as the Rte. 202 project reduced HMA construction costs by 60% and construction truck traffic by 80% en route to receiving the 2013 ROADS & BRIDGES/Asphalt Recycling and Reclaiming Association Recycling Award.

"We are really hoping this takes off in the area. By being able to double your construction dollars it allows you to advance it towards many more projects," said Bitsko, who also credited Roy Little, chief engineer for the DRJTBC for promoting the CIR process.

Soft center, soft approach

The ramps and mainline pavement of Rte. 202 that led motorists to and from the Delaware River Bridge looked like it might require double the work. Alligator cracking and areas of settlement started saturating the area, especially on the ramps on the Pennsylvania side of the span. When it was first constructed in the 1960s, Rte. 202 was supposed to eventually be a bypass that extended through Bucks County, Pa., so a temporary pavement was placed. That evolution never took place, so trucks and commuters began pounding the pavement at an accelerated rate. The decision to change the role of the route may have led to its demise. Pavement cores pulled prior to construction in 2013 discovered a quarter- to a half-inch layer of finely pulverized HMA material between an upper layer of pavement 7 in. thick and a bottom layer that was 3 to 4 in. thick.

"About 6 to 7 in. down you had a separation failure of the layers," said Bitsko. "Not just a void, it was filled with pulverized HMA material."

The DRJTBC now had to make a decision whether to repair the area with conventional HMA or to go with what Bitsko was recommending: foamed CIR. Virginia's I-81 job, which earned a 2011 R&B/ARRA Recycling

Award, was still creating a stir, and information was coming in from the Alaska DOT, which was doing CIR projects in short durations and saving a ton of money.

Because there was a fear that recycling bids would come in much higher due to the fact that specialized equipment had to be trucked in, we decided to allow contractors to make their proposal on either end of the spectrum—conventional HMA or foamed CIR.

"In reality some of these companies travel with this type of equipment. It does not cost any more, but they felt more

comfortable bidding it as an either/or alternate," said Bitsko.

"It was a prudent approach and had the benefit of providing a direct comparison of cost savings between conventional construction and recycling."

Five bids rolled in, and four centered around foamed CIR. The team of James D. Morrissey (prime), Peckham Industries and Reclamation Inc. was the winner with a recycling job worth just over \$1.1 million, producing a cost savings of about \$1.67 million over conventional HMA. Depending on the location, 66-80% RAP would be used.



Above: The ramps and mainline pavement of Rte. 202 that led motorists to and from the Delaware River Bridge looked like it might require double the work. Alligator cracking and areas of settlement started saturating the area, especially on the ramps on the Pennsylvania side of the span.

Below: Since the reopening Bitsko has traveled the route often and said the pavement, which has a 15-year design life, is holding up well. The Pennsylvania Turnpike might try a recycling job in 2014.





The HMA wearing course was placed on day four. The paving train consisted of a Cedarapids CR461 paver laying down a 10-ft-wide mat, a Roadtec SB2500 material-transfer vehicle, a Sakai SW880 II roller, a Hamm 120 roller and a Hamm HD14 roller.

The job was set to go, but there still was not a section dedicated to the process in either the Pennsylvania or New Jersey DOT handbook. Another call was placed to the Alaska DOT, and the agency's construction specifications were modified for use in the Northeast region.

"Their specs are very tough because their conditions are a lot more harsh," commented Bitsko.

It was a good starting point, but there still was not anything to refer to regarding a mix design. Wirtgen America, however, has a whole manual dedicated to foamed cold in-place mix design, and there was more data coming out of Caltrans. Bitsko and his group tapped both for information and finally had a framework in place.

The lack of independent labs to conduct mix-design testing was a concern to the project team. While recycling contractors have the lab equipment, it was felt this would give the contractor performing the testing an undue advantage during bidding. Ultimately it was decided to perform mix designs and final pavement design during construction. Reclamation Inc., Kingston, N.Y., came out to the site, pulverized a few test sections and returned the samples in bags back to its lab. Reclamation then provided mix designs for

a variety of asphalt and cement content, and the pavement design was prepared by Cherry Weber. Reclamation was getting tensile strengths as high as 46 psi during testing. The mix for the mainline, shoulders and ramps of the Rte. 202 process had a 2-in. compacted recycled sub-base, an 8-in. foamed asphalt stabilized base course that contained 2.2% bitumen and 1.5% cement by weight. Type I low-alkali cement was used. For the mainline, crews compacted 10 in. of existing asphalt roadway before applying the foamed asphalt layer. For the shoulders they recycled and blended the 8-in. foamed asphalt layer, and for the ramps they recycled and blended in a 6-in. foamed asphalt layer. A 2-in. HMA wearing course was applied in all three areas. A PG 64-22 asphalt binder was used for the 12-mm mix.

Although Caltrans and Alaska were throwing traffic back on cold in-place projects in a matter of hours, the contractor here decided it would be best to complete the work in four-day phases. The first day was dedicated to milling, where crews took off 2 in. of existing pavement to maintain profile elevation through the project. A Wirtgen W210 performed the work. The second day work consisted of an initial pulverization, compacting with an Ingersoll-Rand SD-105

padfoot roller, grading with a Cat 120 motor grader and rolling a Cat CB 614 steel vibratory roller. The third day was when the foamed asphalt process was executed. Dry cement was laid down by a Hensley spreader, and a Wirtgen 2500s reclaiming/stabilizer came in and handled the foamed CIR process. The Ingersoll-Rand padfoot roller would hit the area again before the Cat motor grader smoothed everything out. A Hamm HD 130 steel vibratory roller and a Cat CB 614 steel vibratory roller handled final compaction, and a Cat PS 360 pneumatic-tire roller sealed the surface. The HMA wearing course was placed on day four. The paving train consisted of a Cedarapids CR461 paver laying down a 10-ft-wide mat, a Roadtec SB2500 material-transfer vehicle, a Sakai SW880 II roller, a Hamm 120 roller and a Hamm HD14 roller.

"If I was going to do it all over again what we would do is pulverize the whole thing and take the material off after we pulverize it because then you are taking advantage of incorporating the top 2 in. of [milled] HMA in the mix, and if you still have to take it off anyway then why not?" said Bitsko.

Crews had 35 days to complete the job, and it took just 25. Traffic was detoured off southbound 202 for a total of 12 days. The northbound lanes, however, posed a problem. Diverted traffic would have to deal with an unsignalized intersection and make a left-hand turn across traffic, so it was decided to keep one lane open at all times.

Hungry to educate

Since the Aug. 8, 2013, reopening Bitsko has traveled the route often and said the pavement, which has a 15-year design life, is holding up well.

The foamed cold in-place process might be picking up in Pennsylvania and New Jersey in the near future, too. Bitsko said the Pennsylvania Turnpike might try a recycling job in 2014, and Rutgers has been working on a spec for the New Jersey DOT. Cherry, Weber & Associates also is setting up a string of lunch-and-learns to educate owners, engineers and contractors.

"I feel the time is right in the Northeast," said Bitsko.

"You get into engineering for certain reasons, and this is the one opportunity you may get in your career to make a difference." **R&B**

For more information about this topic, check out the Asphalt Channel at www.roadbridges.com.