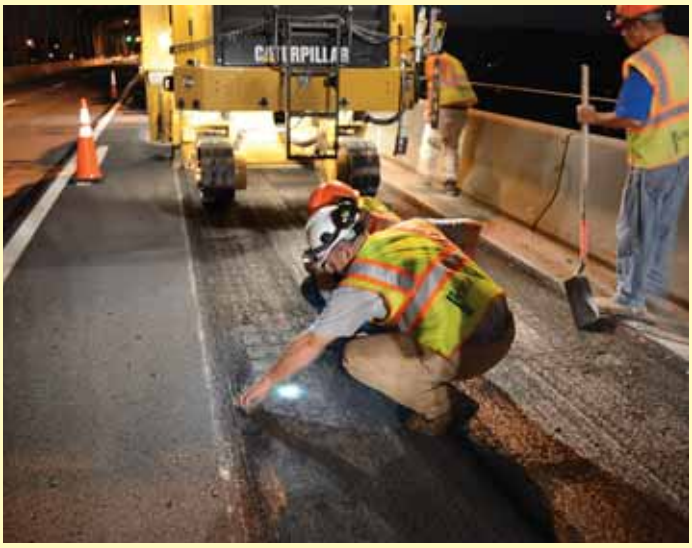

By Jon Sjoblad
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Losing a companion

New deck in place to help prevent moisture damage

Moisture is a constant companion, and threat, to the Hamilton Fish Newburgh-Beacon Bridge.

Moisture penetration and its freeze-thaw cycle had begun to damage the concrete surface of the bridge that carries I-84 across the Hudson River in New York. That led New York Bridge Authority officials to take action that was in the public interest—but certainly a challenge for the contractor.

First, the bridge had to be resurfaced in sections, with only 11-hour nighttime closings allowed. That meant milling, cleaning and paving each portion in a single shift.

Second, the mix contained a high rubber content, which required extremely high temperatures.

"It was a fairly difficult mix to work with, but the most pressure came from moving equipment on and off the bridge deck to mill, clean, dry and pave," said Alfie Bockemuhl, P.E., project manager with Argenio Bros. Inc. "There was a $10,000 per day fine if we didn't get off the road early enough. And there were worries about having to stop in the middle of a shift. We were constantly watching the weather."

The mimicking type

The 1,000-ft twin-span cantilever bridge, connecting Newburgh and Beacon and only a few miles from the U.S. Military Academy at West Point, was last overhauled in the early 1980s. This year, authority officials determined the best course was to repair the concrete surface and any underlying damaged portions of the span, then place a lift of asphalt with high rubber content to seal the concrete and prevent future moisture penetration.

The work started in September and continued through much of October. The specs called for milling 1.5 in. of concrete, then cleaning the area and then placing 1.5 in. of the rubber-based asphalt.

All work on the three-lane bridge took place at night. Crews were allowed to close one lane at 7 p.m. and the second lane at 9 p.m. That left one lane open at all times. Sections of the road were milled and paved in a single night. Crews had to be off the road by 6 a.m.

The lanes are 12 ft wide, with 18-in. outer shoulders. The crown is in the middle of the

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center lane, with a 2% cross slope running off it.

"The bridge had a very consistent deck surface, so we just mimicked it," said Bockemuhl. "We just made sure we kept the same grade when we milled and followed that when we paved."

There was no rideability spec per se, "but we did have to maintain a high degree of rideability," Bockemuhl said.

Shoulders were not milled or repaved. "There is a catch basin every 100 ft, and it would have added considerable time and money to the project," Bockemuhl said. "The bridge authority chose not to include any shoulder work."

Repairs were made before milling even started. Obvious trouble spots were jackhammered and filled with a quick-drying concrete.

A Cat PM200 cold planer then made a pass at a width of 88 in. It took the mill two full passes and one half pass to complete the work.

Milling also exposed more damaged areas. Argenio Bros. crews chipped out the trouble spots and applied fast-patch, which dried within 20 minutes. This created complications because the repairs had to go quickly, as the cleanup—and then paving—still had to follow, and all work had to be completed to meet the 6 a.m. daily deadline.

This portion of the project proved to be a real challenge for the crew. Original estimates were that 250 sq ft of the surface would need the fast-patch. More than four times that amount ultimately was required.

Bridge authorities were determined to make the resurfacing last. Part of that effort hinged on exhaustive cleaning that would ensure adhesion of the sealant, and then the asphalt.

The first step after milling was a traditional sweep to remove heavy dust. Next came a high-pressure wash and another sweeping. The slurry was vacuumed into a truck, as the materials could not be allowed to fall into the Hudson River.

The power wash created moisture, so a jet dryer blow-dried the deck until the concrete moisture content was below 6%. The dryer worked at a temperature of about 300°F, hot enough to expedite drying without damaging the bridge.

An edge sealer was applied, and a proprietary tack, which prevents pickup for the rubber-based asphalt, was placed in the main areas of the cleaned surface.

"The cleaning process was very time consuming," Bockemuhl said. "As a result, we were covering roughly one-tenth of what we normally could do in the same time frame.

"The cleaning also created that many more moving parts on the jobsite. You take the traditional mill and fill out of it, and now you have to make sure the washers all function, that the vacuum truck does what it has to do, that the equipment that dries the deck is ready to go."

The timing meant many of the pieces worked simultaneously. "We didn't have the luxury of completing 100% of one step before starting another," Bockemuhl said. "There just wasn't time."

Besides logistical challenges, it made for jobsite congestion. "Including drivers and subs, we had 30 people on the deck at all times," Bockemuhl said.

There was not much room for maneuvering, since one of the three lanes remained open to traffic, and the shoulders were only 18 in. wide.

"Traffic is always an issue, and that

was certainly the case on this job—on a bridge," Bockemuhl said.

The right way to do it

The paving process had its own challenges. The mix required very high temperatures to liquefy the rubber. The asphalt left the plant at a temperature of 460°-470°F and arrived at the jobsite at about 450°F. It was 350°F behind the paver. Crews were actually off the asphalt at a temperature of 250°F.

A Cat AP1055D asphalt paver with an AS2301 screed placed the 1.5-in. lift at a pace of about 15 ft per minute, at a typical width of 18.5 ft. "The overall job was about doing every step right and not trying to hit a production number," Bockemuhl said.

The paver's automated grade and slope settings helped it match the milled surface.

The operator still had much to watch. "Every 100 ft we tied into a bridge joint or a steel finger joint," Bockemuhl said. "Our approach into and out of those joints was critical in ensuring there were no bumps. There is virtually no flexibility when you're tying into a piece of steel."

With the exception of the high temperature, Bockemuhl said the mix was typical in many ways, but problems did result when it cooled. "Once you lose a good hundred degrees (Fahrenheit), the mix becomes difficult to work with," he said. That meant crews had to be particularly careful when finishing the last section for that day. Crews had to make sure the paver was removed quickly enough and the last of the mix quickly compacted.

The asphalt also proved a challenge in terms of appearance. "Anything you do to that mat creates a blemish," Bockemuhl said. "If you were to walk on it, you'd never get the footprint out. It reacts differently."

Only a breakdown and finishing roller were required. Handling breakdown was a 4-ton roller. It went to work immediately behind the paver; the mix was close to 350°F at first contact. The high temperature was the reason for the lightweight roller.

That roller made a pass up, a pass back, and then moved on. A Cat CB54 tandem vibratory roller handled finish rolling, with two static passes. Testing showed that these patterns produced a little more than 94% of theoretical maximum density.

Bockemuhl looked at the successful completion of the project as more a mastery of logistics than the paving process. "It was all the moving parts, and also finding creative ways to complete the sweeping and cleaning—and drying," he said.

The project serves as a reminder that a paving project is about the successful completion of every step, not just how many tons are placed in a day. **R&B**

Sjoblad is with marketing communications for Caterpillar Paving Products.

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