Quality roadwork

A Pennsylvania paving company claims a NAPA award for its work on I-79

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I-79 in northwestern Pennsylvania is a north-south corridor that links I-90 in Erie to I-70 south of Pittsburgh.

The road was beginning to deteriorate until Lindy Paving, headquartered in New Castle, Pa., undertook a 26.5-mile paving project and was rewarded for its efforts with a 2011 National Asphalt Pavement Association (NAPA) Quality in Construction award. The scale of the project, as well as the time and traffic-management restrictions within which the paver had to work, made Lindy the stand-out candidate for NAPA's award.

The road and the project

I-79 is a four-lane interstate, meaning Lindy was actually milling and repaving 106 lane-miles of road, plus 13 lane-miles of ramps and interchanges. The road was showing several signs of age, according to Joe Conti, quality control manager at Lindy.

"There was raveling, longitudinal joint failures, some potholing and just general distress to the pavement, which was about 12 to 13 years old," Conti told Roads & Bridges.

The project was completed over the course of two construction seasons,

according to Dan Ganoe, vice president of operations at Lindy.

"What was unique, especially to our area, was that it was such a sizeable job," Ganoe told Roads & Bridges. "This is probably one of the largest stone-matrix asphalt [SMA] projects that we've seen in our region."

The first season of construction, which began in July 2010 after a notice to proceed, focused on safety concerns associated with the severely deteriorated longitudinal joint failures that occurred at the pavement centerlines and edges. This repair consisted of variable-depth milling 3 ft in width, centered over the longitudinal joints, down to the existing concrete. Lindy then placed 25,000 tons of Superpave Binder, 19 mm, and 1,600 tons of Superpave Wearing, 9.5 mm. Additionally, bridge superstructure and substructure repair work was started.

The second season of construction involved the completion of substructure work at 15 structures and the replacement of 18 neoprene strip-seal expansion dams on eight structures. Additionally, Lindy completed milling and paving.

"We would set up a milling crew along a 6- to 7-mile section" to be completed during one shift, Ganoe said. "We'd follow that up with placing the scratch course on it prior to putting traffic on it, then flip [the traffic] and do the adjacent lane so that at the end of the week, traffic would not be exposed to any grade deviation between lanes."

After milling, once all four lanes were milled to 1½ in. and 2 in. and scratched, Lindy set up and performed the SMA, which consisted of a 1½-in. overlay.

The new bituminous overlay consisted of about 116,000 tons of material overall. Of this, 31,508 tons was a Superpave scratch course (9.5 mm, PG 64-22) at a 60 lb/sq yd application. A scratch course is a thin lift of asphalt used to help smooth the existing surface and provide a more uniform surface on which to place the next lift.

Overlaying the scratch course was a wearing course of 78,000 tons of SMA (9.5 mm, PG 76-22) at 1½ in. depth.

Additionally, 7,000 tons of Superpave wearing course (9.5 mm, 1½ in. depth) was placed on all the interchange ramps.

The equipment

The main machine used for milling was a Wirtgen 2200, for which Lindy has a 12-ft cutting head. Ancillary milling machines included a Wirtgen 2000 and a Wirtgen DC 120. The 2200 is outfitted with Multiplex, which Lindy used to help increase the smoothness and rideability of the road, Ganoe said.

The paving train for the bulk of the mainline placement consisted of a Cat AP-1055D paver that was equipped with a receiving hopper to work in conjunction with a Roadtec SB2500 material transfer unit. The transfer vehicle hopper and the paver hopper insert represent a 32-ton surge on the road, which is essential in achieving the ultimate goal of a continuous paving operation. A Topcon automated contact sensing system was used to control grade during the mainline placement.

To make the road consistently smooth in ride and appearance, between four or five Sakai high-frequency rollers were used; the number of rollers was dependent upon the production schedule. A typical paving pass was either 15 or 16 ft wide on the SMA course. The rolling pattern consisted of between five and seven vibratory passes per roller. The last roller in the paving train was operated primarily in the static mode. Whenever possible, all rollers would arc off the mat at the end of all passes onto a previously placed surface.

The schedule and traffic management

Even the best-laid plans can go wrong; Ganoe said that as the project went on, dealing with weather and certain time restrictions made it necessary to work around the clock.

"We would mill during the day, then pave the same section at night to gain time on the schedule," Ganoe said. "We had multiple strategies to get things done, whether it was working crews day and night or utilizing multiple crews where it made sense."

Pavement work in Pennsylvania in 2011 was prohibited before April 4, and Ganoe said they were not actually able to begin mainline paving until July.

"We had to coordinate with the structure work and couldn't begin paving until that was completed, which means we placed the majority of the 26.5 miles between July and [the end of] September," he said.

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Special provisions of this contract restricted the work time as well as the lane closures, Ganoe said.

"We had to have things squared up at the end of the week to have the road opened for weekend traffic," he said. "And we were only allowed to close a 6-mile segment of traffic at a time, and we always had to have a buffer in between multiple patterns; we could have two patterns [in the same direction] set up, but we had to have 6 miles in between to alleviate traffic."

Despite these constrictions, the tight schedule Lindy stuck to allowed them to avoid the hefty $30,000 per day road-user penalty that the contract stipulated.

The challenges

One specific quandary was that the project was located a significant distance from Lindy's asphalt plant.

"The average round trip for material to and from the jobsite was two-and-a-half hours, which could increase or decrease depending on where we were in the project, which itself was 26.5 miles long," Ganoe said.

Lindy thus chose to do the bulk of the SMA paving at night, Conti said.

This was beneficial for a couple of reasons. One was that the plant could then be entirely devoted to SMA

production, which was easier for Lindy to do at night because they could isolate the plant for their own use.

Another reason was because traffic was a lot lighter at night than during the day.

"Especially because our plant was in an urban area, there is quite a bit of traffic around rush hours," Conti said.

Another challenge was trucking resources. Conti said they needed to move between 2,500 and 3,000 tons of SMA each day, with 40 to 45 trucks and a plant that was far away.

"Through our trucking managers, we were able to coordinate using some trucks at the ends or beginnings of shifts on other jobs to kind of kick-start a shift, to help make up for some of the longer hauls with traffic," Ganoe said.

By running a tight trucking schedule and constantly re-evaluating its operations, Lindy was able to maximize its resources.

"Once the project started the mainline paving, things were moving so quickly that a daily occurrence was looking at trucking, looking at the previous day's performance, test results and quality and making daily adjustments to help improve and avoid situations the next day," Ganoe said.

Testing and results

A considerable amount of testing was done, Conti said.

"The Pennsylvania Department of Transportation [PennDOT] standard density testing required core samples, and then District One [the PennDOT district in which the project was located] had a special provision for joint density, which required additional cores," he said.

More than 300 total cores were tested, Conti said. The joint wearing density testing was done in two parts over about four months and tested 153 total core samples; the average density was 92.7% during one set of tests and 93.2% for another set, both of which were higher than the minimum requirement of 91%.

The primary wearing density was likewise done in two parts over about four months, utilizing 158 core samples. Here, the average density should have fallen between 93% and 97%; one set of tests yielded an average density of 94.9% and another averaged 94.6% density.

The bottom line

The total project cost was $20.1 million. The existing pavement had an international roughness index (IRI) of 89.7. When all was said and done, Lindy was able to achieve a project IRI of 35.4 in. per mile, using only 60 lb of scratch and 1½ in. of wearing.

"The project was successful because of the effort that [our employees] put into it," Ganoe said. "There was a lot of effort in promoting quality, and Joe's [Conti] group put a lot of effort into training the roller operators and technicians to give us every opportunity to perform the best." R&B

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