

Not Just Pavements: Micro Surfacing Right for New York's Brooklyn Bridge

When New Jersey-based Asphalt Paving Systems Inc. (APS) was hired as subcontractor to pave the Brooklyn Bridge during the summer of 2017, APS vice president Ken Messina knew the project would present some unique challenges.

It was the third time in Messina's career that APS had provided micro surfacing as a pavement preservation project for this historic bridge. With limited paving hours, lane closures starting at 10 p.m. and ending at 5 a.m., the cool, humid atmosphere, a tricky Type 3 mix, and double micro surfacing lifts of 28 pounds each, the opportunity for complications was far greater than with a typical micro surfacing job.

And due to the critical time frame and difficult conditions, a value-added emulsion modifier—Road Science's *ArrTekk 1295*—was used to expedite the project and provide high performance for the contractor and client.

METAL GRID DECK

Built in 1883, the Brooklyn Bridge's deck is constructed as a metal grid, filled with concrete and then surfaced with asphalt. Because of weight restrictions, the deck requires milling and micro surfacing every eight years or so to maintain the surface condition. It sees an annual average daily traffic (AADT) count of approximately 150,000 cars, so logistically, paving had to take place during nighttime hours.

"The span we covered included three lanes in each direction, and it is approximately 3,500 ft. long," Messina says. As the bridge was paved in a double lift, this translates to approximately eight lane miles of paving over the six nights allotted to APS.

Prior to laying down the new surface, all of the bridge lanes were manually stripped of the old micro surfacing, and were then shot-blasted to ensure all of the old asphalt was gone, creating a clean surface for the new micro surfacing to adhere. Any repairs required by the bridge deck then took place. "At that point, the bridge was



Micro surfacing placed on Brooklyn Bridge deck at night under traffic

pretty much our baby for the rest of the project," Messina says.

TYPE 3 MIX REQUIRED

With the extreme traffic count for this bridge, and it being a standalone surface, APS paved with a Type 3 mix design, in lieu of Type 2. "Type 3 has a coarser aggregate, with some larger stone in it," Messina says. "Not all of the aggregates lend themselves well to a micro surfacing with Type 3, which can create some complications with the mix designs."

Nighttime projects create mix challenges of their own. "Compared to a daytime project, you don't have the environmental factors of sun and heat helping the micro surfacing cure, so it's an entirely chemical break," he says. "It's the Brooklyn Bridge, so you're over the river. You've got the humidity; you've got cooler temperatures; you've got the bridge moving pretty much the entire time you're on it, because traffic is still able to have one lane going in either direction, depending on where you're working." For this, APS worked with the emulsion and emulsifier producer to ensure a mix that would set up quickly, yet provide the required strength.

Each night of the project, starting at 10 p.m., approximately two hours of prep work was required to cover expansion joints and drain inlets before surfacing work could begin. "That's where the unions

came in," Messina says. "What we do is specialized, and the unions don't necessarily have people trained in our field. Plus, this is a job where we're using a larger than normal crew at a time of the year when we don't have people just floating around; everybody's working. But we were able to get good union laborers to help us, and we taught them how to protect all of the utilities that were out there, including inlets, which were only 15 ft. apart. Also, the expansion joints have to move in between, and it all has to be protected."

In addition, because APS sourced its specialized aggregate from a quarry in central New Jersey, material transportation needs were high. "We were able to get operators out of the operating halls that kept the trucks loaded with material and moving to the project. Definitely, having reliable labor is key to a good project—on any project," he says.

HIGH PERFORMANCE PAVERS

Messina also credits the paving equipment APS used for contributing to the smooth success of the project. No new equipment was purchased, as APS used its Bergkamp Inc. M210 pavers with which its crews were familiar.

According to Messina, the M210 was ideal for the job for a number of reasons, not the least important being dependability. "We had a limited amount of time in which to have the road closed, prep work finished,



Robust Type 3 micro surfacing mix placed on prepared steel grid deck

and then surface, stripe, and open it in the course of a work night," he says.

"Bergkamp equipment always is dependable," Messina added. "Despite their dependability, breakdowns occur. The key to APS' success is our relationship with Bergkamp. Their customer service is unparalleled, as reps are available 24/7, 365 days a year. This is vital to our business, as the northeast has a relatively short paving season, and liquidated damages are always looming. One day of downtime can be a disaster on many of our projects."

The truck-mounted M210 can carry 10.5 yd³ (8.0 m³) of aggregate in a level struck load, 600 gal (2,271 liters) of asphalt emulsion, and 600 gal (2,271 liters) of water. It features a 65-gal (246-liter) stainless steel additive tank. The unit is powered by an onboard 99-hp Cummins diesel engine located at the front of the unit in an enclosed engine compartment that reduces noise for the driver and crew. It provides flexibility to better manage legal load weight restrictions by allowing up to three tag axles, including one behind-the-drive axle. This feature increases the wheelbase and helps the M210 meet the federal bridge law.

Aggregate is delivered to the pugmill by a belt-over-chain conveyor, which eliminates slippage. Steep hopper walls minimize bridging, while the hopper's polyethylene lining reduces friction. This eliminates the need for a vibrator, which decreases problems with loose bolts and damage to welds and components.

Asphalt emulsion is delivered to the pugmill by a positive-displacement heat-jacketed gear pump. The pump is powered by a jackshaft that is common

to the aggregate conveyor to provide a consistent asphalt emulsion-to-aggregate ratio. The variable-speed, dual-shaft, multi-paddle pugmill has a dual hydraulic drive, which provides even mixture and coating of the aggregate.

"With the M210, we got good mix action out of the pugmill, and we had really good coating on our aggregate, combined with a good mix design and a good emulsion. It was a great product at the end of the day. And the M210 keeps up very well with the speed of the pugmill. It put down a 28-lb. application in one lift, which is really heavy for a micro, especially when it comes to a Type 3," Messina says.

VALUE-ADDED EMULSION

For this project, the emulsifier used was ArrTekk 1295, which incorporates a micro surfacing emulsifier technology that lengthens micro surfacing life cycle by up to 30 percent, allows for better workmanship and aesthetics, and enables quicker traffic return for faster paving and increased production rates, the manufacturer says. This emulsifier chemistry was used to formulate the emulsion and complete the micro surfacing mix design.

Road Science's plant and field support personnel traveled to the emulsion plant and to the Brooklyn Bridge to ensure emulsion production and the micro surfacing application proceeded smoothly.

The value-added emulsifier chemistry was vital to the success of this project because it resulted in, according to Road Science:

- A quicker set time of less than seven minutes



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Work on historic structure took place in view of Stars and Stripes, in sight of World Trade Center site and just ahead of Independence Day weekend

- A 50 percent reduction in additional water added to the mix to achieve proper mix consistency
 - Faster and stronger cohesive strength development, allowing for earlier pneumatic rolling of the micro surfacing as soon as 20 minutes after placement
 - APS exceeding the anticipated project schedule by allowing for more paving time within the short lane-closure timeframes, and by enabling sooner placement of pavement markings
 - Project completion within four and a half nights, vs. the six nights allotted.
- This emulsifier chemistry also can be used in micro surfacing applications over asphalt pavements as well as in cape seal and crack relief interlayer applications. 

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