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# NEW ENGLAND CONSTRUCTION



## Northbridge DPW

Continues Goal of 'No Road Left Behind'



# The Town of

# Northbridge

## Embraces Cost-Efficient Micro Surfacing as DPW Upgrades Road Network

B Paul Fournier



A Sterling nurse truck feeds materials to Bergkamp paver as town's first micro surfacing takes place

**W**ith the full financial support of selectmen, the Public Works Department of the Town of Northbridge in south central Massachusetts has launched an ambitious road upgrade program with a distinctive title, “No Road Left Behind,” that succinctly describes its ultimate goal.

No Road Left Behind is the brainchild of Northbridge Public Works Director Jim Shuris and Highway Superintendent Bob Van Meter – both highly experienced veterans of road construction and maintenance in public as well as private sectors.

Shuris has been employed in the public sector for about 18 years and in the pri-

ivate sector for about 18 years. As a registered engineer and licensed contractor in Massachusetts, he has been involved in structural and geotechnical engineering, and is also an adjunct engineering professor at Mount Wachusett Community College.

Van Meter’s diversified background includes working for private contractors as a truck driver and equipment operator, as sales representative for pavement materials suppliers Hudson Asphalt and All States Asphalt, as Assistant DPW Director for the City of Warwick, Rhode Island, as Project Manager for a Florida utility company, and as a bridge Inspector for Massachusetts Department of Transportation.

### DPW’s Operations

Working within its annual operating budget of \$1 million, the DPW serves a community of about 15,500 residents, the majority of whom live in Northbridge’s five distinct villages. Five DPW personnel work in the Sewer Division, while seven are assigned to the Highway Division and are responsible for maintaining 80 miles of roads – most of which (95 percent) are paved with asphalt materials. The DPW is also responsible for maintaining town vehicles and equipment. A private utility company provides water to the town.

Director Shuris and Superintendent Van Meter organized the “No Road Left Behind” program to protect the town’s

investment in its road and street infrastructure. The program calls for preventive maintenance to be applied to the Town’s good roads first. This is in line with the Federal Highway Administration’s current funding philosophy that encourages transportation agencies to maintain and preserve the roads they have, not provide incentive to wait until roads deteriorate so badly they have to be totally reconstructed.

### Treating Best Roads First

Northbridge’s “No Road Left Behind” program runs the gamut from crack sealing to chip sealing to hot-in-place recycling, “mill and fill” overlay, and full depth reconstruction. Which treatment



to use depends on road conditions, location, traffic volume, and available funds. Collector roads and major arterials fall within the No Road Left Behind category, and undergo preventive maintenance surface treatments while pavements are still structurally sound. Full-depth reclamation is performed on minor roads whose pavements have completely failed. Once reclaimed, these pavements are then subject to regular maintenance, too.

Hot-in-place recycling and mill and fill overlays are performed on road pavements in intermediate conditions, in other words, the wearing course is badly deteriorated but the underlying pavement and base are still sound.

Shuris indicated that this program of treating best roads first then intermediate and worst-condition roads will ultimately achieve DPW's "No Road Left Behind" goal. He noted that Town Selectmen have expressed confidence in this method by allocating \$625,000 to the program. This money supplements Chapter 90 funds (Massachusetts Local-Aid Program), which are used to contract out pavement upgrade projects. The \$625,000 is part of a five year, \$6 million capital project program that includes \$2.4 million for sewers and \$2.1 million for water improvements.

The DPW has been aggressively pursuing its ultimate goal.

In 2011, the DPW spent \$300,000 to mill and overlay a collector road. The following year they spent \$550,000 using hot-in-place recycling on an existing chip seal road.

### Micro Surfacing Debuts in a Subdivision

In August 2013, for the first time, the DPW tried out micro surfacing. This was part of an overall pavement upgrade that included full depth reclamation, reconstruction and micro surfacing. The latter involved treating about 2 ½ miles of roads in a 10 to 15 year old subdivision that extends from Northbridge into neighboring Sutton. Sealcoating Inc. of Braintree, Massachusetts, won the contract, which called for micro sealing about 40,000

square yards in Northbridge and 5,000 square yards in the Sutton portion of the subdivision.

Shuris pointed out that micro surfacing was chosen over chip seal because subdivision residents wanted a smoother, quieter riding surface.

"We were somewhat familiar with the overall benefits of micro surfacing from attending meetings of the Worcester County and Massachusetts Highway Associations, but had never used it before the subdivision contract. Then we learned more details of the treatment such as the application process in discussions with Pat Hanlon, the Regional Sales Manager for Sealcoating."

Hanlon explained that micro surfacing is a cold-mix material, created at the job by blending mineral aggregate, mineral filler such as Portland cement, water, and a modified asphalt emulsion. It can be used on high-traffic volume roadways, doesn't require rolling and is usually ready to accept traffic in less than an hour. Since it can be spread to variable thicknesses, micro surfacing is ideal for not only applying wearing courses but for leveling surfaces and filling wheel ruts as well.

Based on these discussions, Shuris decided to try HiMA micro surfacing for their next road surface treatment.

### 'Like Staining a Deck'

Hanlon notes that Sealcoating has amassed a great deal of information and experience with micro surfacing since it began performing the treatment in 1987. The company recognized early on the importance of preserving existing pavements with a protective coating:

"Pavement preservation is like staining your deck," said Hanlon. "If you don't stain the deck, water wreaks havoc with the wood and soon you have to replace the whole deck. The stain protects the surface. With micro surfacing, you put a protective layer of asphalt on the existing pavement surface and you extend the life of the pavement."

"It's taken time for towns to realize that

# National Effort Monitors Performances of HiMA Micro Surfacing

The use of the highly polymer modified asphalt (HiMA) micro surfacing in Northbridge, Massachusetts, is part of a U.S. product development program guided by Kraton Performance Polymers based in Houston, Texas.

Pete Montenegro, Kraton Market Development Manager, organized 2012 and 2013 commercial field applications of HiMA with selected U.S. contractors who offer micro surfacing application services. The goal is to monitor the performance of the 6 percent SBS polymer loading of the emulsion binder used in the micro surfacing work as compared to the conventional 3 percent polymer loading to document any service life extension of the HiMA pavement preservation treatment.

Montenegro worked with Chris Lubbers, Kraton Technical Sales Manager, in providing professional support to contractors and their transportation agency customers regarding HiMA technology. Their expertise was provided to Vance Brothers of Missouri, Viking Construction of Texas, AS-TECH of Minnesota and Sealcoating of Massachusetts. Montenegro assisted Sealcoating managers with educat-

ing Northbridge DPW officials about HiMA.

HiMA micro surfacing is also applied on cell No. 1 of the testing facility (MnROADS) managed by the Minnesota DOT and on a field application test sponsored by the Pennsylvania DOT in Lancaster, Pennsylvania. Montenegro and Lubbers coordinated these product development activities for Kraton as well.

In all cases, the performance grade liquid asphalts that were modified included either a PG64-28 or a PG52-34. The SBS polymers were added at 6 percent by weight of the liquid asphalt and then emulsified for use in the micro surfacing application. In addition to using the softer PG asphalt grades and double the polymer loading, the HiMA formulation differed from conventional micro surfacing in emulsion content – up to 16 percent in the case of Minnesota compared to the conventional 12 percent.

Montenegro and Lubbers recommended these mix design changes in an attempt to extend the service life of the treatments by enhancing the durability attributes of the micro surfacing mix.

pavement preservation treatments like micro surfacing can do this, but most are now starting to use pavement preservation methods.

"Towns don't have a lot of revenues coming in these days. They rely on Chapter 90 funds to protect their roads. The cost of rehabilitating or reconstructing pavements is going through the roof. So the towns want to apply a less expensive surface treatment to the road before it gets to the point that the road has to be reconstructed at a much higher cost," Hanlon said.

### Mix Design – with a Difference

Sealcoating's mix design for the subdivision project was in accordance with the International Slurry Surfacing Association's (ISSA's) recommended standards. The mix proportions applied in the field were predicated on test results obtained during mix design. For Northbridge, the aggregate used was a durable 100 percent crushed stone with a Type II ISSA gradation (90 to 100 percent passing the ¼ inch sieve), and the emulsion content ranged between 12 percent and 13 percent of the dry aggregate weight. The mineral filler used was Type I Portland cement at 1 percent of the dry aggregate weight.

There was however, one difference between the standard mix design and the Northbridge application.

The "glue" that holds micro surfacing contents together is the modified asphalt emulsion. Boosting the effectiveness of pavement preservation treatments has been the increasing use of asphalt modifiers such as polymers that improve resistance to rutting and raveling of aggregate. Generally, increasing the polymer dosage improves these characteristics, but there is a practical limit to polymer concentration. As dosage surpasses 3 percent, the binder becomes increasingly viscous, eventually reaching a point where the asphalt is practically unworkable. In the case of highly pre-modified micro surfacing emulsions, a balance between ease of emulsification and polymer loading is necessary.

Houston-based Kraton Performance Polymers solved this dilemma with the development of their D0243 SBS copolymer. Used in highly modified asphalt (HiMA) formulations, this modified SBS polymer can be added to asphalt in dosages up to 7.5 percent without significantly increasing viscosity. For HiMA micro surfacing treatments, a polymer dosage of about 6 percent by weight usu-



Alligator cracks around manholes and other structures were removed by Felix A Marino Co. using infrared machines and Mari-Mix high-performance patching material





Main garage of town's DPW which is responsible for maintaining miles of roads

ally provides the desired balance for ease in emulsifying the asphalt.

### Preparations and Application

Van Meter oversaw the HiMA micro surfacing of the subdivision by Sealcoating Inc. Before the project started Van Meter and Sealcoating's Hanlon had walked the route to identify areas requiring special attention. Among these they cited alligator crack failure around manholes and catch basins, which were subsequently repaired by Felix A. Marino Co. Inc. using an infrared machine. The average infrared patch measured about 8 feet by 8 feet. Marino softened the patch of pavement, added aggregate, re-mixed the materials and leveled and compacted the pavement.

Other preparations included crack sealing by Sealcoating crews, and sweeping by town forces. The final preparatory work consisted of placing an asphalt tack coat over the entire pavement surface.

Sealcoating not only performed the application but also supplied the materials including HiMA asphalt emulsion, aggregate and Portland cement filler. They applied the micro surfacing in two lifts, using a Bergkamp M1 continuous paver that was fed materials from two "nurse"



Highwa Superintendent Boban Meter left and DPW Director im Shuris PE established No Road Left Behind program

trucks.

Van Meter said two lifts of micro surfacing were applied on the road curb-to-curb, a scratch or leveling course, topped by a wearing course. The double course thickness measured between  $\frac{3}{8}$  and  $\frac{1}{2}$  inch, thin enough to preserve the curb reveal and preclude having to raise manholes and other structures. They didn't

have to close the road while work progressed. Sealcoating treated one side of the road at a time, keeping one lane of traffic open under direction of a police detail. They were able to put traffic on the micro surfacing in less than an hour, so there was minimum disruption for motorists.

### Future Micro Surfacing Planned

The project began after school opened during the first week in September, and the entire project was finished in just three work days, Van Meter said. The HiMA micro surfacing is expected to have a service life of 10 years, about two to three years more than micro surfacing using conventional modified asphalt emulsion.

For comparison purposes, Van Meter said he will check a number of locations in other towns that have been treated with micro surfacing, but he said his initial reaction to the town's first experience with it was positive.

"The micro surfacing went down without any incidents. It has a consistent, pleasing appearance and smooth riding surface throughout the entire subdivision. And we had zero complaints from residents," Van Meter said.

The DPW director agreed: "We are very happy with the results," said Shuris. "The road surface has a monolithic appearance from curb to curb within the entire subdivision. Next year we intend to apply this pavement preservation treatment to a little over four miles of a major north-south collector road." 🐾