

NEW ENGLAND CONSTRUCTION



Two Historic Bay State Towns Utilize Newest Road Seal

NON-HAZARDOUS CHEMISTRY for PAVEMENT PRESERVATION

Noted for Supporting the Revolutionary War, Lexington and Milton are Now Exemplifying Support for a Different Kind of Change

By Paul Fournier

Two of Massachusetts' oldest towns are employing a new, fundamentally different pavement preservation treatment. Settled around 1640, the historic towns of Lexington and Milton, famous for waging the first battle of the American Revolutionary War, and drawing up the Suffolk Resolves archetype of the Declaration of Independence, respectively, have added a novel, environmentally safe tool to their pavement preservation toolboxes.

Last year, Lexington became the state's first municipal government to contract for Delta Mist, a plant-based product, rather than a petroleum-based product, for preserving asphalt pavements. Delta Mist is a spray-applied emulsion that functions as a penetrating asphalt rejuvenator fog seal.

The contractor, indus, actually applied Delta Mist on three streets and a petroleum-based asphalt rejuvenator on three other streets. This year, indus applied just Delta Mist on 10 additional Lexington streets, and on a mile of a major road in Milton.

Restoring Pavement

As defined by the National Center for Asphalt Technology (NCAT), a fog seal is a type of pavement preservation treatment applied to an existing asphalt pavement surface to preserve its functional and structural integrity and delay a more costly rehabilitation treatment in the near future. Typically, a fog seal consists of applying a slow-setting asphalt emulsion on an existing pavement surface without a cover aggregate. It is intended to penetrate into the surface pores of the pavement to seal very small cracks and surface voids as well as coat surface aggregate particles. A rejuvenating fog seal contains petroleum or bio-based rejuvenators that restore properties of the aged asphalt binder in the surface layer, reducing the likelihood of cohesive failure within the asphalt binder film and slowing the rate of aging caused by oxidation.

Launched following several years of field research and development, Delta Mist penetrating asphalt rejuvenator is based on Delta S rejuvenator technology developed by Dr. John Warner and a staff of research scientists at the Warner Babcock Institute for Green Chemistry (WBI). Delta Mist is manufactured, marketed and sold by Collaborative Aggregates LLC of Lowell, Massachusetts, as an emulsified version of Delta S that is spray-applied as a topical rejuvenating seal at ambient temperatures. The new product is designed to increase pavement life by restoring oxidized asphalt and reducing loss of fines and aggregates. It also improves cohesion while retarding crack propagation of the pavement surface. According to the manufacturer, with proper pavement surface preparation and application rate, Delta Mist slows the asphalt oxidation process for up to three years or more with each application.

Advancing the Application

Braintree, Massachusetts-based indus has been working with municipalities and other clients in developing pavement management and preservation process tools for several decades. The contractor has applied Lexington's pavement preservation treatments for several years, and consulted with Collaborative Aggregates as the new Delta Mist product was being developed. These efforts are conducted under the direction of Sales and Marketing Manager, Dan Patenaude, P.E.

Alan Viall, Regional Manager of indus, provides expertise to the Town of Lexington in the selection of cost-



effective techniques and products to manage and preserve the pavements of the community's road network.

Viall has a long working career dating back to 1978, with experience in both private and public works construction and maintenance. As Regional Manager, he provides indus pavement management products and services to municipalities in Massachusetts, New Hampshire and Maine.

In Lexington, he works with the Town Engineer, John Livsey, P.E., and Town Senior Civil Engineer, Michael Sprague, in selecting roads for various pavement preservation treatments. Sprague is responsible for coordinating the selection process with the town's consultant, The Beta Group.

"The Town selects candidate streets for preservation treatments based on their pavement management program, then I take a ride over those streets to make sure they're quality candidates for our treatments," Viall said.

Lexington recognized the benefits of using pavement preservation treatments on its roads a decade ago, beginning with an aggressive cracksealing program. A few years later it advanced to other pavement preservation applications such as microsurfacing, fog sealing and cape sealing (a combination of a chip seal covered with a slurry seal or microsurfacing). In addition, the Town has utilized mill-and-fill reclamation and cold-in-place recycling.

Since the Town embraced the concept of pavement



Crews of contractor indus applied the plant-based Delta Mist rejuvenating seal at the rate of 0.08 gallons per square yard at approximately ambient temperature.

preservation, its pavement condition index – PCI – has improved from 68 in 2010 to 85 this year. That’s one of the best community PCIs in the state, Viall noted.

Pleased with the results from Delta Mist applications in 2019, the Town chose the product for additional street applications in 2020.

No Re-Striping Needed

Work crews of indus applied the Delta Mist in Lexington during the second week of August. The weather was hot and humid, with ambient temperatures running between 85 and 95 degrees, and the temperature of the Delta Mist was recording between 90 and 100

degrees. They treated 82,500 square yards of streets at a rate of 0.08 gallons per square yard of pavement, and used the same equipment as the previous year – a late-model Ford truck with a 2,000-gallon Etnyre tank and distributor spray bar.

“When I looked at the first street application, I realized the important advantage of this product,” said Sprague. “It goes down white, but within a short time it turns gray then actually becomes colorless or clear. The painted pavement markings start becoming visible again in minutes and are completely clear within hours. So no re-striping is necessary. There’s no re-doing crosswalks, and the granite curbing doesn’t

get messed up with asphalt. Nothing needed to be covered before the application, so no temporary covers had to be removed afterward. This results in a significant cost savings, and it’s safer, because the traffic lane markings come back almost immediately.”

He compared the results from the 2019 application of Delta Mist on three streets versus that of the three streets treated with petroleum-based fog seal:

“The one-year results on the pavement from Delta Mist seem to be the same or even better than from the petroleum-based product,” he said. “And you have the added benefits of no re-striping or cleaning up the granite curb.”

Work crews of indus also sprayed Delta Mist in Milton, the town where the Suffolk Resolves were signed on September 9, 1774, later to become a model for the Declaration of Independence.

Milton Opts for Transparency

Fran Conroy, Regional Manager, serves as indus' representative to Milton. He is a 25-year construction veteran who has been with the company for 15 years, specializing in pavement management and preservation. He said his main responsibility to customers is being able to offer them products and services that are environmentally safe while helping to solve budgetary problems. He's been working with Milton officials for some 10 years, and introduced them to the concept of pavement preservation.

"I started them on cracksealing, which is an entry gateway to pavement preservation, then on to microsurfacing. Now they're trying fog seal for the first time. It's Delta Mist, a 'green' pavement preservation product designed to prevent raveling, cracking and oxidation," he said. "There are a number of fog seal products available, but most contain asphalt, and after you apply them you have to redo the pavement markings and sometimes that costs as much as just applying the product. And the curbing gets soiled too and needs to be cleaned.

He said using Delta Mist avoids these problems. "It goes down white, fades, turns light gray, and within a couple of hours it's completely clear or transparent. And it's relatively inexpensive due to the transparency of the product. For example, if a fog seal application cost about \$45,000, removing, then replacing, the stripes might cost \$60,000."

Conroy has been working with Chris Trudel, Milton Town Engineer, for about five years, and previous Milton Town Engineer John Thompson for 10 years.

The contractor applied the Delta Mist fog seal to a 1-mile section of Milton's Central Avenue, a busy road that runs from The Boston line/Milton at Dorchester, and terminates in Milton Center. Approximately 25,000 square yards of pavement was treated by indus, using the same equipment and application rate as in Lexington.

According to Trudel, they considered a number of suitable fog seal options but chose Delta Mist for its transparency and because it's environmentally friendly.

"We have a lot of new pavement markings for bike lanes, crosswalks, traffic islands, and six side-street intersections, and we wanted to preserve them. Half the cost of the fog seal project would have been for re-stripping," he said. "Overall, we're very happy with how the Delta Mist worked."

COLONIAL RESISTANCE

The first battle of the American Revolutionary War took place on the Lexington Common on April 19, 1775. On the night before, 700 British Army soldiers set out from Boston, intending to destroy Colonial gunpowder and cannons stored in Concord, as well as capturing separatist group leaders John Hancock and Samuel Adams. Once the British arrived on the Lexington Common, they faced 77 Minutemen of the Lexington Militia, commanded by Captain John Parker. Somebody fired a shot, provoking an exchange of fire between both sides that killed eight Minutemen and wounded nine more.

The British then marched toward Concord where a larger militia of 2,000 Minutemen awaited them, forcing the British to abandon their mission and turn back to Boston. On the way, the colonists engaged the British in guerilla warfare, standing behind stone walls, trees, houses and sheds while shooting the retreating soldiers, some of whom began abandoning their weapons, clothing and equipment in order to flee faster.

The Suffolk Resolves, a declaration made on September 9, 1774 by the leaders of Suffolk County, Massachusetts, were signed in Milton and used as a model by the drafters of the Declaration of Independence in 1776. The declaration rejected a number of punitive Intolerable Acts passed by Parliament against the Massachusetts Colony and resolved to boycott imported goods from Britain unless the Acts were repealed.

The Suffolk Resolves House, where the Resolves were passed, is today maintained as the headquarters of the Milton Historical Society. At the time, Milton was part of Suffolk County but is now in Norfolk County.

A number of counties in other colonies adopted declarations of grievances against Britain during the period before the Declaration of Independence, including at least 90 other documents favoring independence in the spring of 1776, but the resolves from the Massachusetts County Conventions in August to October 1774 were the first to promote across-the-board noncompliance with British governmental authority.

Following the fog seal application, the painted pavement markings start becoming visible again in minutes and are completely clear within hours.