

NEW ENGLAND CONSTRUCTION



**RIPWA Demonstrates
Innovative Gravel Road
Stabilization Process**

UNIQUE STABILIZATION SOLUTIONS

RIPWA Officials View Stabilization of Exeter Road by Town's DPW Crew Applying Recycled Asphalt Shingles, Emulsified Petroleum Resin, and Lignin Tree Glue Compound



Exeter DPW's Volvo G930B Grader reshapes gravel surface of a section of 200-year-old New London Turnpike during demonstration of gravel road stabilization as part of an outdoor class by the Rhode Island Public Works Association.



Shown observing the road stabilization process, from left, are: Bob Dexter of Felix A. Marino; Erin Hayes, RIPWA Administrative Assistant; R. Paul Montenegro, Consultant; and Steve Mattscheck, Exeter Public Works Director.



A Mack truck distributor applies Safe Road Services' lignosulfonate compound made from lignin, a byproduct of the paper pulp making process. (Photo courtesy of MEDIABOSS)



Volvo grader operator reworks surface to reestablish a proper crown.

By Paul Fournier

Public works officials from a dozen towns in the Ocean State recently learned how using such disparate substances as asphalt shingles, aromatic resins and tree glue can reduce the time they spend fixing and stabilizing their gravel roads. Gathered at a rural site in Exeter, they watched work crews applying the products as part of an outdoor class and products demonstration held by the Rhode Island Public Works Association (RIPWA).

Sections of the historic New London Turnpike were chosen for the applications. The 200-year-old Turnpike, once the principal non-coastal stagecoach route between Providence, Rhode Island, and New London, Connecticut, is a low-traffic-volume road with a gravel surface. It is regularly maintained and was an ideal candidate for the product applications, according to Steve Mattscheck, Director of the Exeter Department of Public Works. He said much of the old Turnpike gravel surface requires frequent dressing-up.

Maintaining Exeter Roads

Mattscheck has been involved in improving Exeter roads for more than 30 years, first as mechanic and truck driver, then as Highway Department foreman for 15 years, and as DPW Director for the last 15 years. He is also the current President of RIPWA and Second Vice President of the New England Chapter of the American Public Works Association. He noted that the department is responsible for maintaining about 100 centerline miles of roads, which includes approximately 20 centerline miles of gravel roads.

The department has a workforce of 15 full time employees plus eight to 10 part time employees. Part-timers are hired as needed

for snow removal, and as replacements in summer to cover for vacations and sickness. "We hire when we need to," he said.

As in numerous other cities and towns, the DPW of Exeter employs a measurable portion of its limited resources to maintaining gravel roads.

"We have a lot of population so we grade certain gravel roads every three weeks. In addition, there are local farm trucks hauling corn and produce, so we need to maintain those gravel roads more frequently. Also, some side roads don't get much traffic, and others have dead ends, so we grade these every three months," he said.

Gravel Roads are a Universal Challenge

With a sizeable portion of its roads covered by gravel surfaces, Exeter's situation is similar to that of many communities throughout the nation. According to the USDOT's Bureau of Public Roads, there are 1.3 million miles of unpaved rural and urban public roads in the U.S., out of a total of 4.1 million total miles of public roads. Therefore about one-third of all public roads are unpaved, and the Bureau of Public Roads says most of the unpaved roads have gravel surfaces.

Maintaining gravel roads requires a substantial amount of time and can be costly. Mattscheck said the Exeter DPW has been collaborating with R. Paul Montenegro, Providence-based consultant, to find a cost-effective process to stabilize the town's gravel roads. A civil engineer specializing in pavement preservation and recycling, Montenegro is guiding the department through several trials to perfect the application of various products in the town's maintenance protocol. RIPWA's outdoor class on gravel road stabilization dovetailed with this effort.

Innovative Products Demonstrated

Recycled asphalt shingles (RAS) and two markedly different liquid products were showcased during the one-day event. Two consecutive road sections were established for the product applications.

The demonstration began with the placement of RAS over the entire cross-section of the road. RAS was donated by Chris Carney of C. Carney Environmental, Raynham, Massachusetts, whose company produces up to 500 tons per day of product using a CBI Shingle Pro XL 406 Shingle Shredder. The finely graded material was spread by two DPW trucks (International and Freightliner) equipped with Tenco side-dumping salt-spreaders. R. Paul Montenegro coordinated the donation.

The spraying of the liquid products on the separate sections followed RAS placement. Using an Etnyre 2,000-gallon distributor, Felix A. Marino & Sons applied a proprietary emulsified petroleum resin, while Safe Road Services applied a lignin compound product with their distributor.

Next, Exeter's Volvo G930B Grader reshaped the road's gravel surface. The grader was equipped with sharp, perforated steel Olofsfors Sharq P-300 blades mounted on a 12-foot-wide moldboard. The blades broke up compacted gravel without crushing the aggregate as the operator reworked the existing surface and reestablished a uniform crown. This was followed by a second liquid product spraying.

For comparison purposes, the DPW crew also applied RAS to a section of road that did not receive any liquid stabilizers. "They got lucky with weather, it was a good day," said Steve Mattscheck.

Serendipitous Discovery

Consultant R. Paul Montenegro managed the application of RAS and the emulsified petroleum resin. He noted that Mattscheck was the first to try this method on Rhode Island gravel roads, and that his Exeter approach is now being emulated by other towns. In describing the evolution of the RAS protocol, Montenegro said that while he was gathering RAS samples at a recycling facility he noticed that the yard was paved with what appeared to be hot mix asphalt.

"I then realized it was paved with RAS that had fallen from the trucks and had therefore stabilized and bound the gravel."

Montenegro said he has worked with Dr. Walaa Mogawer, P.E. at the University of Massachusetts Dartmouth's Highway Sustainability Research Center, on ways to cost effectively incorporate recycled materials into paving systems. During this collaboration he said they determined they had to use an asphalt rejuvenator to soften the RAS.

"Our finding was that the aromatic resins refined out of asphalt and emulsified with water were the most cost effective and active rejuvenators. As it happens, Felix A. Marino and Sons of Peabody, Massachusetts, have been making and supplying aromatic rejuvenators since the 1970s," Montenegro said. He indicated that the emulsion does not leach out due to storm water and is therefore accumulative. As a result, smaller dosages can be applied on subsequent applications making it more cost effective. He added that the use of RAS with the addition of penetrating asphalt emulsion resin is a clean way of binding and waterproofing the base.



Felix A. Marino Co. Inc. International truck sprays emulsified petroleum resin to stabilize the road's gravel surface.

Marino's 2,000-gallon Etryre distributor applies emulsified petroleum resin over gravel surface that has been covered with recycled asphalt shingles.



'Tree Glue' Compound Stabilizes Road

The second liquid product applied during the RIPWA class was an active lignin sulfate compound supplied by Kevin Barrett of Safe Road Services, Franklin, Massachusetts. He pointed out that lignin is a naturally occurring substance in woody plants. About one-quarter of dry wood is lignin, making it the second most prominent component of the wood part of a tree, with cellulose being the principal component. He said lignin is the glue that holds the wood fiber of a tree together. In the paper pulp mill process, cellulose is separated from lignin and the lignin is recovered for use in a variety of different products.

One of those products, lignosulfonate – sometimes called “tree sap” in the field – has been used as a treatment for dirt roads in Europe and North America since the 1920's. The Environmental Protection Agency says lignosulfonate products work best when incorporated into the surface gravel, providing cohesion to bind soil particles together.

Successful Demonstration

DPW Director Mattscheck said he was pleased with the results of the products used for the RIPWA class. With regard to RAS, he said he has actually employed the material to dress up a number of gravel roads with great success. Mattscheck continues to work with Consultant R. Paul Montenegro on such projects.

“The RAS is not expensive. It provides unbelievable dust control and helps with erosion control as well. Traffic does the rolling. The product does not blow away in wind and keeps gravel in place, so it's a dust control product. It keeps roads in better shape longer so it prolongs the period between gradings. It's a win for us. Less work, less maintenance, less equipment used, less man hours.

“We've used RAS on roads with grades up to 5 percent. After one heavy rainfall we inspected that road and it was still in excellent shape. So we are doing this treatment on more and more roads, because RAS keeps our gravel in place.

“This has been very successful and beneficial for the town,” he said.