Research Project 26

Determination of Structural Layer Coefficient for Roadway Recycling Using Foamed Asphalt

COMPLETE!

Recycled Materials Resource Center

University of New Hampshire

Federal Highway Administration

The final report for Project 26 is available on-line at:
http://www.rmrc.unh.edu/Research/Rprojects/Project26/P26finalreport.asp

Project Objectives

Determine the proper structural number/layer coefficients for foamed asphalt mixes.

Project Description

Maine DOT was awarded a Technical Problem Solving grant to assist them with their foamed asphalt trials. Foamed asphalt is a relatively new technology that uses a mixture of reclaimed granular base material, reclaimed asphalt, asphalt binder, water and air to form a "foam" that can be compacted into a stabilized base layer. The appeal of foamed asphalt technology is that it provides a method for full depth pavement recycling that result in a strong, stiff base course. Strong sublayers allow for a thinner asphalt layer, which can result in significant cost savings. Since 2001, approximately 20 different foamed asphalt mix designs have been completed and, so far, more than 10 foamed asphalt projects have been constructed in different parts of Maine. Yet, while mix designs exist for foamed asphalt, there is very little information on layer coefficients available for designing pavements with foamed asphalt layers. The goal of this project is to determine the proper structural number/layer coefficient for foamed asphalt mixes. In 2003, three foamed asphalt projects built in 2002, along with the Belgrade Route 8 project (RMRC Project 16), were selected for a detailed investigation to determine the structural strength of foamed asphalt layers. The work involved pulverizing the existing HMA surface together with approximately 50 mm of the underlying gravel to a minus 50 mm size. A Wirtgen Model WR2500 pulverizer was used to introduce foamed asphalt to the recycled asphalt pavement. The treated recycled asphalt pavement was surfaced with 30 mm of 9.5 mm nominal maximum aggregate size (NMAS) shim and 30 mm of 9.5 mm NMAS surface mix. The analysis included Falling Weight Deflectometer (FWD) tests, resilient modulus tests on cores using the indirect tensile mode (ASTM D4123), Asphalt Pavement Analyzer (APA) tests on beams and tests for fatigue properties (for determination of strain versus fatigue life, transfer function) using beam fatigue equipment (AASHTO TP8). Using this data, Maine DOT was able to determine the structural numbers for the foamed asphalt pavements. They also found that the most important factor with regard to performance was the percentage of large (plus 50 mm) aggregate. Smaller virgin aggregate may need to be incorporated into the mix when reclaiming base layers with large aggregate to improve the performance.

Reclaimer pushing the asphalt tanker and introducing the foamed asphalt into the base.

Project Partners

- Worcester Polytechnic Institute
- Wirtgen GmbH

End Products

Guidance to State DOTs on developing layer coefficients for foamed asphalt pavement layers.

Further Information

The Recycled Materials Resource Center (RMRC), a cooperative agreement between the University of New Hampshire and the Federal Highway Administration, is a national center that promotes the appropriate use of recycled materials in the highway environment. Its focus is on the long-term performance and environmental implications of using recycled materials.

Project Principal Investigator
Dale Peabody
Maine Dept. of Transportation
16 State House Station
Augusta, ME 04333-0016
Tel: (207) 287-5662
Fax: (207) 287-3292
Email: dale.peabody@state.me.us

RMRC
University of New Hampshire
Gregg Hall, 35 Colovos Road
Durham, NH 03824
Tel: (603) 862-4704
Fax: (603) 862-3957
http://www.rmrc.unh.edu