A Report of FHWA-AASHTO European Study on Quiet Pavement: Findings about Asphalt Pavements

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Sponsors

Federal Highway Administration (FHWA)

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SCAN TEAM
Home States

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Tire/road noise is dominant

Dr. Erik Vos, Scientific Manager
Dutch Road Administration
Ministry of Transport
Denmark May 3-5, 2004

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The Netherlands May 6-7, 2004

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Innovation Program on Noise Mitigation (IPG)

IPG is a corporate project from:
- Dutch Ministry of Transport, Public Works and Water management
- Dutch Ministry of Environmental Affairs

Goal
- Reduce traffic noise significantly, focus on:
  - Source related measures
  - To implement and not to invent

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Roads to the Future (RtF)

Road Surface of the Future

- The road is made in a new way
- It is modular
- It can be adapted to specific requirements

Projects:
- Modular (quiet) road surface
- Intelligent road surface
- Dynamic road surface

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Results

1. The Very Silent Sound Module
   – Helmholtz resonators, modular very thin silent asphalt top layer

2. The Rollable Road
   – Helmholtz resonators, two thin rollable asphalt top layers, flexible layers

3. Modieslab
   – prefab two layer porous concrete slabs

4. The Adhesive Road/at present The Rollpave
   – rollable porous asphalt, adhesive geostatic support layer
Measured noise reductions

- 100 km/h
- reference is DAC
- SPB-method

- **Modieslab**: 6 - 7 dB(A)
- **The Rollable Road**: 6 dB(A)
- **The Adhesive Road**: 6 dB(A)
- **The Very Silent Sound Module**: 5 dB(A)
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France

BBSG – dense graded asphalt
BBDr – thin porous asphalt
BBTM – high porosity asphalt
BBUM – ultra-thin asphalt
ES - PCC
Italy May 12, 2004
United Kingdom May 13-14, 2004
Key Findings

- Smaller aggregate size asphalt surface mixes using a dense or semi-dense gradation is the technique used by many EU countries to obtain low-noise pavement surfaces. These mixes are used for low to medium speed traffic applications.

- Porous asphalt systems using single-layer and double layer systems are used or planned to be used by several EU countries for significant noise reductions on high-speed facilities or facilities with significant truck traffic.

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Key Findings

➤ Recycling of porous asphalt was performed using a hot-in-place process in Italy to renew a porous layer.

➤ Safety performance of low-noise surfaces has been maintained or enhanced compared to traditional pavement systems in all countries reviewed.
Key Findings

- Durability of low-noise pavement systems varies from 7-15 years depending on the pavement system and the experience level of the owner agency.

- Low-noise pavement surfaces typically do not provide a structural contribution to the pavement. However, some countries utilize a fractional structural contribution. Concept similar to “perpetual pavement”.

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Key Findings

- There is a gradual move to performance based specifications, “lowest and best”. If the contractor is required to warranty the pavement for several years, they must be responsible for design and inspection.

- There are no real field tests for acceptance with regard to noise with the exception of a permeability test. Performance is assumed based on experimental sections and past experience but is not tested on the project for compliance.
Key Findings

- There was no special equipment or training required for construction of the quiet pavement systems.

- U.S. should do additional work in the asphalt binders for porous asphalts to improve durability of the porous asphalt pavements.
Key Findings

- Issues surrounding porous asphaltic concrete surfaces must be further investigated including: clogging, safety, skid resistance, black ice in cold weather, snow removal, winter maintenance, durability of the surface, recycling of modified asphalt binders, cleaning, environmental impacts of cleaning, the failure modes, and acoustical durability.
Key Findings

- Extensive use of SMA type surfaces used in Europe should be reviewed for comparison to performance and maintenance issues on SMA’s in the US.

- Increased use of 9.5mm SMA surface can provide significant noise reduction compared to traditional dense graded 12.5mm or 19mm dense graded HMA.
IMPLEMENTATION:

- Interesting pavement technology for application in the United States:
  
  - Thin asphalt layers (4.75mm and 6mm) dense, semi-dense and open asphalt surfaces for application on low-speed facilities.
  
  - Double layer porous asphalt systems for high-speed facilities or roadways with high truck traffic.
  
  - Investigate variable density materials (expanded clay, slag, etc.) in asphalt concrete.
Available!

The Roadmap to Quiet Highway
SQDH web site
FHWA Report
Mark your Calendars

A-SH!-PHALT 2005
Early November 2005
Lafayette, IN

Pavement Preservation Scanning Tour