Virginia Tech TRANSPORTATION INSTITUTE
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VTRC Virginia Transportation Research Council

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INTERNATIONAL SUSTAINABLE PAVEMENTS WORKSHOP

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Low-noise pavements (LNP)

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Noise reduction contribution to more sustainable pavements and pavement policy

Transportation noise is a global environmental problem, often identified by people as the worst environmental problem directly affecting them

It is also becoming recognized as a serious health problem (”people die younger due to noise”)

Pavement characteristics influences transportation noise levels by up to 15 dB (in extreme cases)

The character of the noise may include highly annoying features (tones); easy to influence by pavement design

Noise exposure has substantial economic effects; reported as almost matching those of traffic accidents; thereby its cost is a significant part of GNP

EU, Japan and Hong Kong have very ambitious noise abatement programs

US abatement programs are so far only modest

State-of-the-Art and Practice

US	Europe, Japan, Hong Kong
LNP applied only on high-speed roads	LNP applied on high- and low-speed roads
Extremely noisy tined PCC often used until now	Transv textured CC phased out (too noisy)
Trial-and-error re. improv. transv. tined PCC	Better texturing for CC (EACC, diam. ground)
Extensively replaced by quieter PCC textures	Porous asphalt (PAC) used extensively
Especially diamond ground PCC preferred	Double-layer PAC the best – increasing use
Porous asphalt not much used (low voids only)	Thin layers give almost same noise reduction
Instead, Asphalt Rubber (AR) dvlpd and used extensively in AZ; excellent results comp to tined PCC	Thin layers gaining popularity dramatically
	In some countries, the national road network is already almost totally paved with LNP
Several other states trying AR, mostly positive results	CBA and LCA frequently applied
	Research going on re. innovative pavements
FHWA hesitant to adopt AR for noise abatement – waiting for results of QPPP	Extensive research – very large projects

Some knowledge gaps

How to successfully apply European and Asian LNP in the US ?

How to successfully apply US ARP as LNP in Europe and Asia ?

Acoustic longevity/durability of LNP (incl AR)

Acoustic longevity/durability of thin layers

How to apply LNP with acceptable longevity in climates where studded tires are used (e.g. Washington, Canada, Scandinavia) ?

Effective and economically justified cleaning of porous pavements

How far can one go with adding rubber into an asphalt pavement ?

A holistic view on pavement performance (consider all affects)

Why can't US trucks and busses be as quiet as in other developed countries (this affects the efficiency of LNP) ?

Research issues with high impact potential

Knowledge and experience transfer to successfully apply European and Asian LNP in the US

Knowledge and experience transfer to successfully apply US ARP as LNP in Europe and Asia

Study and improve the acoustic longevity/durability of LNP (incl AR)

Study and improve Acoustic longevity/durability of thin layers

Improve LNP with acceptable longevity in climates where studded tires are used (e.g. Washington, Canada, Scandinavia)

Develop effective and economically justified cleaning of porous pavements

Try adding more rubber into an asphalt pavement ?

A holistic view on pavement performance (consider all affects). Use CBA to put everything together into one evaluation.

More research issues with high impact potential

Focus on LNP on low-speed roads and streets (<60 km/h), i.e. urban areas, adapting them better for such use

In particular, develop porous pavements for sufficient durability at intersections; e.g. consider adding epoxy

Develop poroelastic pavements for road applications (PERSUADE and so on)

Consider the interaction pavement – tire – vehicle, with maximum efficiency in view; e.g. how can LNP become more effective when/if vehicles are changed

Overall effect of replacing noise barriers (called noise walls in the US) with LNP; e.g. using a model for estimating the subjective effects of noise barriers