



Quiet concrete roads

for the *COMMUNITY*

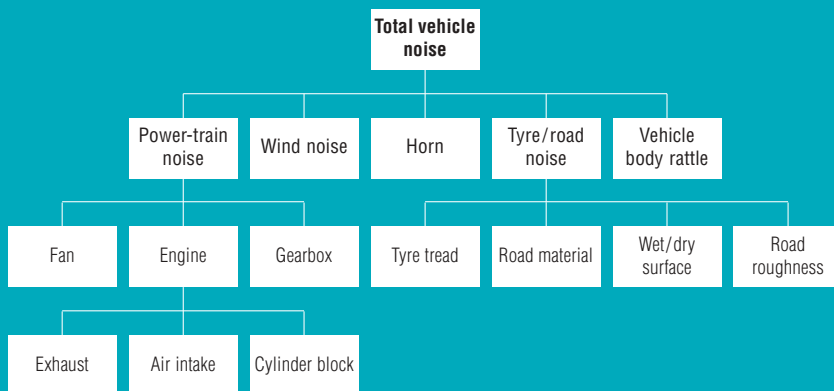
Quiet concrete road surfaces make a substantial contribution to meeting environmental guidelines limiting roadside noise levels on high-speed urban roads. These surfaces are not expensive to provide and do not require expensive maintenance or cause user delays by regular removal and replacement. Furthermore, they will retain good skid resistance under all conditions for a long time.

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Traffic noise

Traffic noise is made up of noise from vehicles and the condition of the road surface.



The total amount of traffic noise can be affected by factors such as the type of traffic (trucks or cars), traffic speed, accelerating and braking areas at intersections and the grading of the road. Australian road and traffic specialists have been actively involved in minimising traffic noise in urban areas by using techniques such as:

- distancing housing from major roads;
- restricting traffic speeds to a maximum of 80 km/h;
- using earth berms or noise barriers; and
- using quiet and safe road surfaces.

At traffic speeds of up to 80 km/h, it is generally accepted that the main component of traffic noise is the engine and gears of a vehicle, and body noise in the case of trucks. At higher speeds, the noise generated by a vehicle's tyres and the road surface becomes significant in the total amount of noise. For this reason, the question of the role of the road surface as a contributor to noise becomes an issue only on high-speed urban roads, such as motorways, highways and arterial roads.

Australian Research and Development

Over the period 1990–1995, research and development was undertaken in Victoria and New South Wales by public- and private-sector organisations to develop the quiet concrete surfaces that are now in use. Two key factors applied to the research and development:

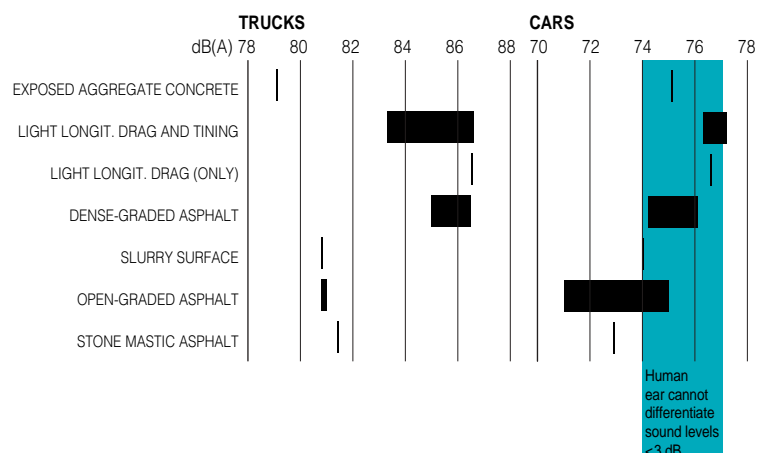
- The work was done on full-scale in-service roads, not small laboratory samples.
- The materials, equipment and methods required for these surfaces are already available and in use by the concrete pavement construction industry and do not add significantly to construction or maintenance costs.

Roadside noise measurements from the developmental surfaces were made in accordance with Australian Standards and with actual cars and trucks at various traffic speeds.

Further refining of construction techniques for these surfaces and investigations of other concrete surfacings, such as porous concrete, are continuing.

Overall noise level dB(A) from trucks and cars travelling at 80 km/h

Research results show that the exposed aggregate concrete surfaces are quiet for both trucks and cars. Due to the nature of materials used in pavement construction, some non-concrete surfaces become less effective in reducing noise after as little as twelve months. This is now being taken into account in acoustic assessment of traffic noise.



The quiet concrete surfaces

Two types of quiet concrete road surface are currently in use:

- exposed aggregate finish
- modified hessian/tyned finish.

Exposed aggregate

The surface is made using concrete with a smaller than normal stone size. After placing, the concrete is coated with an agent which slows down its setting. The next morning, the surface is brushed with a large mechanical rotary broom to remove a thin layer of mortar and partly expose the stones. The quiet surface is then complete.

Modified hessian/tyned finish

This surface is made using standard paving concrete. A short strip of hessian is dragged along the surface to make it gritty. For high-speed conditions, a shallow flexible comb is then drawn across the surface before the concrete sets. The quiet surface is then complete. For traffic speeds up to 80 km/h, the combing can be omitted.



TOP: Vehicle noise measurement on Keilor Park Drive, Keilor Park, Victoria

Close-up views of concrete surfaces – exposed aggregate (CENTRE) and a tyned surface (ABOVE)



Other benefits of concrete roads

A typical continuously reinforced concrete pavement under construction



In addition to being quiet, concrete surfaces have other good safety properties and economics. It is not just the initial cost of building a road which matters. The ongoing maintenance costs over the next 30–40 years need to be accounted for.

- Concrete surfaces have, and will retain, good skid resistance for the travelling public in both dry and wet conditions for a long time.
- Concrete surfaces are durable. They do not need any maintenance to preserve their quiet behaviour. They do not need renewal every 5–8 years, saving the removal and replacement costs and eliminating user delays.
- Concrete, with its lighter colour, reflects more light than a dark surface, resulting in good night-time visibility.
- Concrete pavements are made from entirely Australian-sourced materials.

Reference Research Information

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This brochure has been prepared by ACPAVE – a non-profit organisation promoting the construction of concrete pavements, identifying research needs to improve design and construction of concrete pavements, and the transfer of information among pavement engineers.

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