QUIET PAVEMENT — Coming to a Highway Near You

By Wayne Jones, P.E.,
Asphalt Institute Field Engineer

The squeaky wheel gets the grease! This adage has been true since 5000 B.C. when man first used wooden wheels to haul heavy loads. The latest variation of this old saying goes something like this: a noisy pavement gets the attention of the pavement engineer. Recent actions by public agencies have proven that community outcries for quieter pavements have been heard.

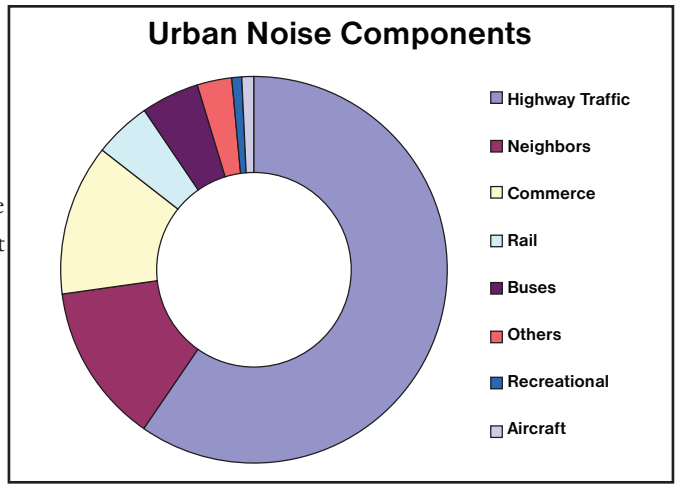

Figure 1

Background

By definition, noise is any unwanted or excessive sound. Noise, especially transportation noise, has become one of the most pervasive forms of pollution in today's environment. It affects our lives at home, at work and at play.

Urban noise is an indication of economic activity and commerce, and up to a point, an improving quality of life. But in extreme situations, it can lead to anxiety, stress and other health problems. When that happens, noise needs to be controlled or abated.

European Experience

The quest for quiet pavements originated in Europe where the preservation of historic vistas prevents the use of noise barrier walls. Most of the efforts in European countries have been on the elimination of the noise at the source.

Currently there are two different approaches to achieve quieter hot mix asphalt (HMA) pavements in Europe. One method uses thin overlays with negatively textured, gap-graded mixes such as stone matrix mixtures. The second method calls for single or double layers of open-graded porous surface mixes that absorb both water and air and do not allow them to become trapped between the tire and the pavement.

Research at the Transportation Research Lab in the United Kingdom (UK) found no loss of skid resistance when specifying HMA surfaces and a 3 to 6 dBA reduction in noise generated when compared to other types of pavement. Such a reduction in noise is roughly the equivalent of increasing the distance from two to four times between the source and the listener. Based on these findings, the UK has launched a ten-year program to overlay the majority of their high-speed motorways with HMA to promote noise reduction.

Arizona Experience

Arizona paved a 1500-foot stretch of freeway in the Phoenix area with an open graded friction course (OGFC) to improve skid resistance and visibility during heavy rains. When motorists noticed the distinct reduction in noise provided by the new pavement surface, they began asking "Why can't we have a similar overlay near our neighborhood?" The local media picked up on the public's interest and ran feature stories about the quiet pavement surface. From this public outcry, came AZDOT's commitment to overlay all of the freeways in the Phoenix area with OGFC. The overlay program proved to be so successful at reducing noise levels around the city that the Phoenix Metropolitan Planning Organization agreed to loan AZDOT $34 million to accelerate the overlay program.

Research in California has shown that a quiet pavement overlay can maintain good acoustic qualities for the majority of its life. If the pavement remains quiet, then an agency will not have to renew the surface based on acoustic performance. When the surface needs to be rehabilitated, the new overlay can incorporate the latest quiet pavement technology.

Based on the Arizona experience and research in California, the Federal Highway Administration has announced

the "Quiet Pavements Pilot Program" that allows credit for quiet pavement technology. Under the program, a state can take up to a 5-decibel credit for the use of quiet pavement surfaces. They must agree to reapply a quiet HMA surface when monitoring shows that the old pavement is noisy.

Elsewhere Around the Country

During recent public hearings on pavement selection in Ohio, citizens from one community complained about a particularly noisy stretch of newly reconstructed Portland cement concrete (PCC) pavement. As a result, Ohio has begun to research quiet pavement technology and now considers noise a secondary factor in the pavement selection process.

The National Center for Asphalt Technology (NCAT) has begun to monitor and catalog pavement noise levels from around the country using a close-proximity (CPX) noise measuring trailer. By using the CPX procedures, tests can be done at highway speeds. To date they have measured over 320 pavement surfaces. They have found that HMA pavements with the smallest top-sized aggregates tend to produce the lowest noise level. Figure No. 2 shows the results for all pavement types in NCAT's database.

QuietPavement.com

To learn more about tire/pavement noise, log on to www.quietpavement.com, a new website sponsored by the Asphalt Pavement Alliance. The site has links to information about the history of road noise, case studies, and a tool that lets you compare the decibel levels of common neighborhood noises such as people carrying on a conversation, a dog barking, a blender and a jackhammer. One of the links is to streaming video files taken by NCAT's CPX trailer while doing actual noise measurements on Phoenix freeways. The file shows the dramatic difference between the original PCC pavement and the new OGFC surfaces. Also on the site is an interactive section where you can build your own community and test the noise readings produced by selecting different pavement types.

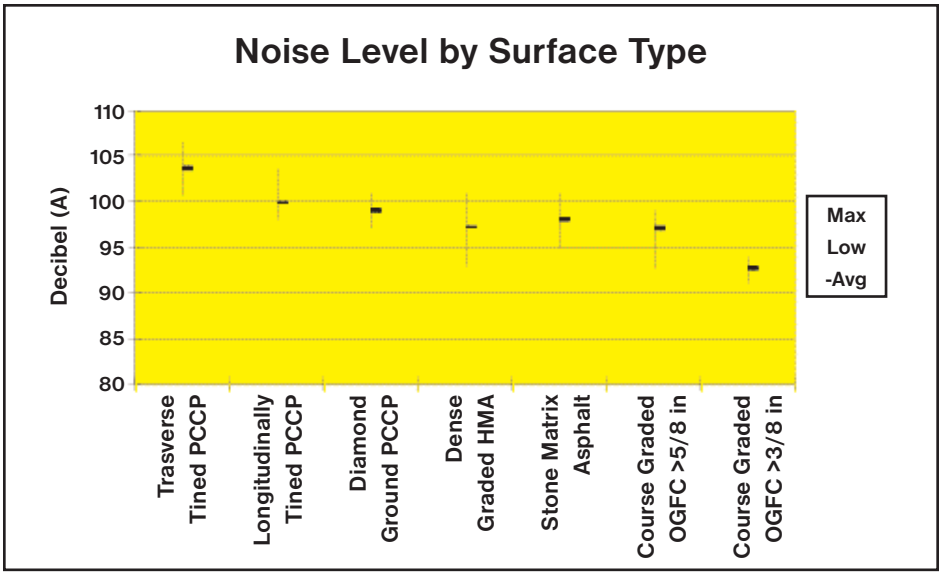

Figure 2

For more about quiet pavement technology, visit quietpavement.com.