HOT TOPICS IN NOISE

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Scientists often discuss the newest things that they are doing so that others know what's going on. The subject of this article is noise, a term which, for most people, needs no explanation.

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Community noise and vibration from transportation

Noise from transportation affects nearly everyone (Figs. 1–3) and noise levels are regulated by Federal laws. Transportation noise that enters a home can be reduced by home improvements.

The Federal Aviation Administration (FAA) oversees airport noise studies. Their NextGEN program is working on making quieter aircraft. Aircraft noise exposure is still computed using the Integrated Noise Model (INM), and revision 7.0b was recently released. The FAA is working toward having one modeling program to cover both air quality and noise (AEDT), which should be available in 2010.

For highways, the state highway departments and turnpike authorities are responsible for addressing community noise. Two ways to reduce this noise source are to use barriers along the road (thereby blocking the view), or, in warm climates, to use porous pavements. A recent medical study in Sweden has related high blood pressure to highway noise.

Sustainable energy—wind turbines

Sustainable energy is all the rage with governments at all levels in the US. What is usually meant is not coal, oil, or natural gas (fossil fuels), but rather solar panels, wind turbines, and geothermal wells. Unfortunately, energy produced from these devices is quite expensive and the government has subsidized them to encourage their development. Solar panels and wind turbines are thought to be "environmentally friendly."

It has been known for some time that neighbors of wind turbines sometimes complain about their noise (Fig. 4). This is particularly true when they are placed in rural areas. Background sound levels in these areas are often low, and nighttime levels of 35 dBA have caused complaints. The turbines produce a "swishing" sound, which is very annoying. To avoid these problems, about a mile of buffer space is needed

Fig. 1. Transportation: Air.

Fig. 2. Transportation: Road/Truck.

Fig. 3. Transportation: Highway.

Fig. 4. Wind Turbine: Hull, MA.

around the turbines; however, wind and other causes of sound refraction may cause the turbines to be heard at much greater distances.

National parks

The National Park Service (NPS) has been working on the problem of maintaining the character of wilderness areas and their sounds since the early 1990's. The first studies came as a result of the presence of air tour operations in the Grand Canyon. It was found that the ability to hear the aircraft was a key factor. This is at odds with the typical noise exposure criterion in use by the Federal Aviation Administration for people around airports. A new standards effort has just been started (S3-SC1-WG4) on this topic under the direction of two scientists at the NPS.

Soundscapes

The term *soundscape* is just like landscape, but for sounds (Figs. 5–8). It is used to describe an area, usually in a city, to try to avoid the negative implications of the word *noise*. Recent work has shown that sound level is often less important than the viewpoint of the listener. Influences of the norms of society may play an important role.

In addition to the "sound walks" which have occurred in recent years at Acoustical Society of America meetings, a new workshop series has started to bring acoustics into the planning processes in cities. The first such workshop occurred in Portland, Oregon.

Green building codes and standards

For the first time since the U.S. Green Building Council's Certification *Leadership in Energy and Environmental Design* (LEED) standards were introduced, credit can now be taken for acoustical design for schools and hospitals. The classroom standards give one credit for a design that is similar to that discussed in the national standard on classroom acoustics (Fig. 9).

Credit for hospitals is given in the current revision of the green building documentation for hospitals (Fig. 10). A national standard will soon be available whereby two credits are possible—one for speech privacy and one for ambient levels. The speech privacy criterion is given when conversations between doctors and patients are not easily overheard. The ambient level criterion is given for proper design so that the interior of the hospital is quiet enough to be restful. This is not the case in many current designs.

Energy savings from noise control

The material for sealing of sound leaks on an outside wall is the same as that which is used for energy conservation, namely caulking and weather stripping. In both cases, the best improvement is for a solid material to be placed between the inside and outside of the building. Both acoustical performance using the sound transmission class (STC) as a criterion, and infiltration (the amount of air that may came in through the cracks) are available for doors with different degrees of treatment.

Fig. 5. Soundscape: Open Air Market.

Fig. 7. Soundscape: Dogs/Children.

Fig. 6. Soundscape: Park/Playground.

Fig. 8. Church.

Fig. 9. Noise in Classrooms.

Fig. 10. Emergency Entrance/Boston City Hospital.

For each untreated door with an STC of 21 dB, the annual fuel usage for infiltration is $756. Reducing the crack sizes by half would increase the STC to 24 dB and reduce the fuel use to $378. For two types of treated doors, the STC improved to 42 dB, with fuel usage of $23.30 and 44 dB with fuel use of $2.66 per year. Thus, depending on the initial condition of the door, cost savings range from $378 per year to $753 per year, per door.

Hearing loss from use of personal music devices

Over time, the listening of music has moved from portable boom boxes to the modern mp3 players of today. While this has been good from the point of view of the listener, it has brought a new potential problem to light.

Several years ago, a medical doctor noticed that some his teenage patients had developed the kind of hearing loss associated with working in factories all day. Careful research showed that the levels developed in the ear were 74 to 110 dBA (loud shouting to ear-splitting). This result has been repeated again and again in current research. The European Commission is studying whether to make a rule of requiring automatic volume control. The fact that people are subjecting themselves to this kind of sound when they are not working has made it harder to attribute hearing loss strictly to places of work. AT

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